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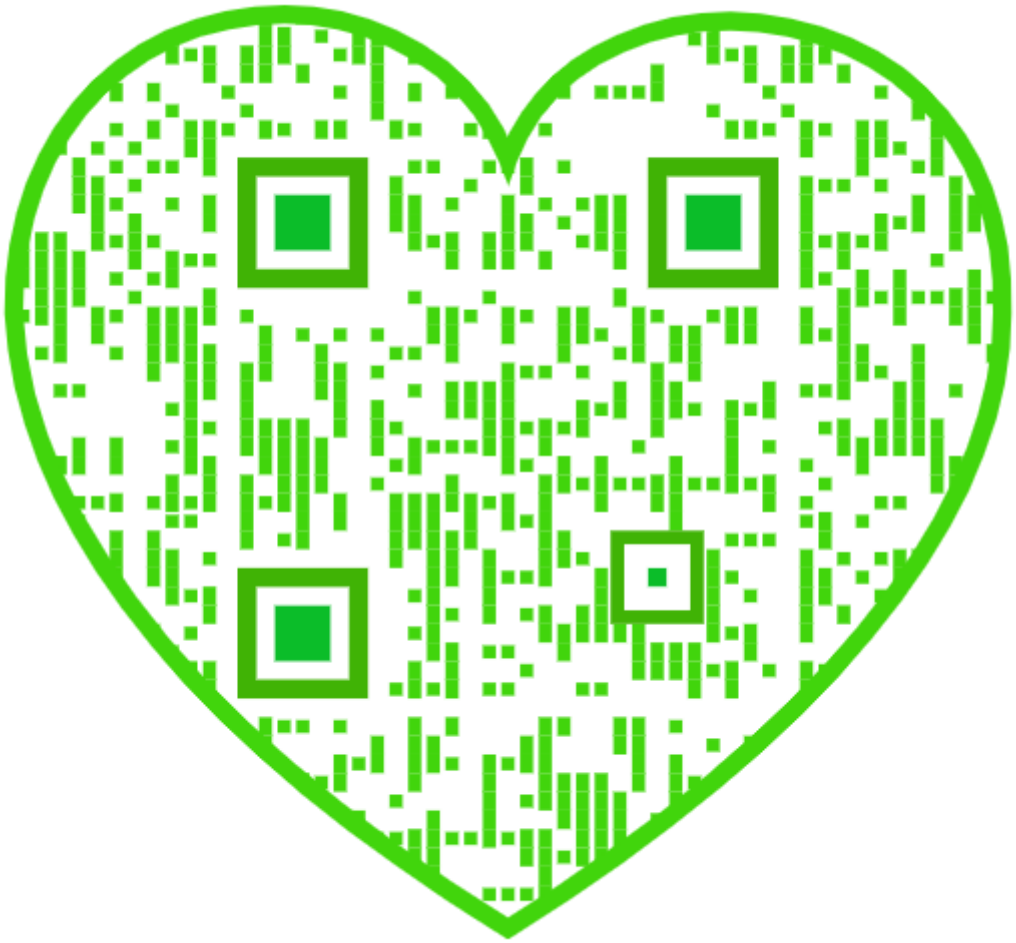
MACHINERY'S SHOP RECEIPTS AND FORMULAS

THE INDUSTRIAL PRESS, NEW YORK



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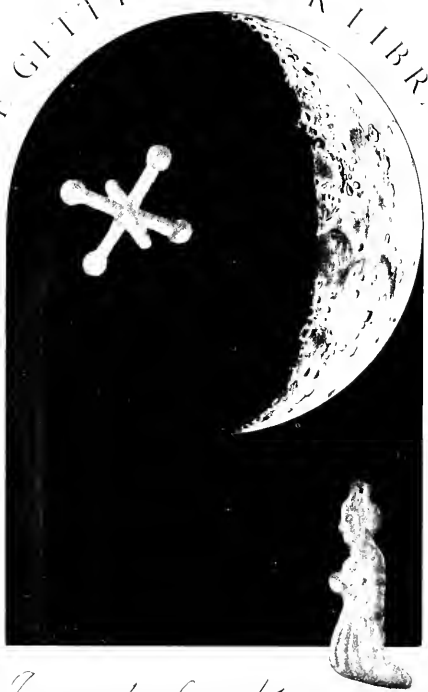

Why ask for the moon
when we have the stars?

MACHINERY'S SHOP RECEIPTS AND FORMULAS

412 Shop Receipts and Formulas
Selected from MACHINERY
Classified and Revised

SECOND EDITION

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SHOP RECEIPTS AND FORMULAS

BLUE-PRINT WRITING FLUIDS

Marking Fluid for Blue-prints

The following receipt for marking fluid for blue-prints has given me satisfaction. The fluid is composed of potassium oxalate, 1 ounce; gum arabic, 1 dram (60 grains); water, 6 ounces; cobalt-blue to color. WILLIAM H. DAVID.

Staten Island, N. Y.

White Writing Fluid for Blue-prints

A fluid which I find is as good as any I have ever used for writing white on blue-prints is made of equal parts of sal-soda and water. Another fluid, not as good, is made by mixing equal parts of borax and water. Both these fluids must be used with a fine-pointed pen; a pen with a blunt point will not work well.

Allegheny, Pa. C. W. MORRISON.

White and Red Solutions for Writing on Blue-prints

I find the following means convenient for making a solution for marking white lines on blue-prints. I add to a small bottle of water enough washing soda to make a clear white line, then I add enough gum arabic to it to prevent spreading and making ragged lines. To make red lines I dip the pen in red ink and then add a little of the solution by means of the quill.

Cleveland, O. ED. H. REMDE.

Solution for Writing on Blue-prints

A solution for marking on blue-prints, which I have tried with comparatively good success, is a very thick lime water. Have a good deal more lime than will dissolve, and shake up the bottle just before using, and it will not spread. Possibly this solution could be colored with red ink, but as I prefer the white I have never tried it. G. V.

Red Writing Fluid for Blue-prints

For red writing on blue-prints, I take a piece of common washing soda the size of an ordinary bean and dissolve it in four tablespoonfuls of ordinary red writing ink to make a red fluid. The only way I know of to keep it from spreading too much is to use a fine pen to apply it with, and write fast so as not to allow to much of the fluid to get on the paper, for it will continue eating until it is dry. H. E. W.

Colored Inks for Blue-prints

In order to make red and white solutions for writing on blue-prints, dissolve a crystal of oxalate of potash about the size of a pea in an ink bottle full of water. This will give white lines on blue-prints; other potash solutions are yellowish. If this shows a tendency to run, owing to too great strength, add more water and thicken slightly with mucilage. Mix this with red or any other colored ink about half and half and writing may be done on the blue-prints in colors corresponding to the inks used. W. H. SARGENT.

St. Johnsbury, Vt.

To Make Changes and Corrections on Blue-prints

Sometimes I find it necessary to make changes and corrections on blue-prints; to do this I use a solution of sodium carbonate and water, with a little red ink mixed in. This gives a very pleasing pink color to the changes which at the same time is very noticeable. The amount of sodium carbonate used depends upon the surface of the blue-print paper as some coarse-grained papers will look better if less soda is used and *vice versa*. However, the amount of powdered soda held on a five-cent piece dissolved in a bottle of water (Higgins ink bottle) gives very good results.

Sharon, Pa. R. F. KIEFER.

Retouching Blue-prints

An excellent solution for retouching or marking in details on blue-prints can be prepared according to the following receipt. The solution consists of 75 grains of potassium oxalate dissolved in 1 ounce of water. If the solution is too thin and watery, it may be thickened by adding some kind of a gum preparation. It can be applied with a pen, as ordinary ink. The blue background is removed very rapidly by the solution, but it is important that the print be immediately washed, as the solution has a tendency to soak into the pores of the paper and blur the lines.

Olney, Ill. T. E. O'Donnell.

SOLUTIONS FOR PREPARING BLUE-PRINTING PAPER

Blue-printing Formula

I have used the following receipt for blue-prints with much satisfaction. The same formula may be applied for postal cards on which it is desired to print landscapes or similar views. Make a solution as follows: Water, 3 ounces; ammonia citrate of iron, 300 grains; oxalate of potash, 75 grains. Dry in the dark, print and then develop in the following: Water, 3 ounces; nitrate of silver, 15 grains; citrate of soda, 150 grains. Add ammonia to dissolve the precipitate, and acetic acid until slightly acid. Wash slightly and dry. I have found this to make a better blue-print in every detail than any other of the various known receipts. Robert B. Otis.

Orange, Conn.

Chemicals for Blue-prints

To make blue-print paper use citrate of iron and ammonia, 1⅞ ounce dissolved in 8 ounces of water, and red prussiate of potash, 1¼ ounce, dissolved also in 8 ounces of water. Keep in separate bottles until wanted for use. When wanted for use, measure equal quantities from each of the above bottles. Shake so as to mix it well. It is then ready for putting on the paper. When the two are poured together, the mixture must be kept away from white light and should be applied in a room illuminated with a ruby light only. The paper must be dried in this room and kept in the dark until used. One ounce of mixed chemical will cover about 4 square feet of paper. David Melville.

Detroit, Mich.

Practical Formula for Sensitizing Blue-print Paper

To prepare the blue-print solutions, dissolve 3¾ ounces of ammonia citrate of iron, in 18 ounces of water, and put in a bottle. Then dissolve 2⅝ ounces of red prussiate of potash in 18 ounces of water, and put in another bottle. When ready to prepare the paper, have the sheets piled one on top of the other, coating but one at a time. Darken the room, and light a ruby lamp. Now, mix thoroughly equal parts of both solutions and apply the mixture with a sponge in long parallel sweeps, keeping the application as even as possible. Hang the paper in the dark room to dry and keep it dark until used. Any of the mixture left, from sensitizing the paper, should be thrown away, as it deteriorates rapidly.

Often, in making blue-prints by sunlight, the exposure is too long, and when the frame is opened the white lines of the print are faint or obscure. Usually these prints are relegated to the waste basket but if, after being washed as usual, they are sponged with a weak solution of chloride of iron, their reclamation is almost certain. When the lines reappear the print should be thoroughly rinsed in clear water.

Often a drawing, from which prints have already been made, requires changing. The blue-prints then on hand are worthless, requiring more time to correct than it would take to make a new print. An economical way of using the worthless prints is to cancel the drawing already thereon, sensitize the reverse side, and use the paper again. Julian Day Page.

Youngstown, Ohio.

METHODS OF TREATING BLUE- AND BROWN-PRINTS

To Make Vandyke Prints more Transparent

To a pint of best grade gasoline, add as much paraffine as the gasoline will readily dissolve and spread this solution evenly over the print with a soft brush, wipe dry with a piece of white cotton rag and print in the usual manner. Vandyke prints treated in this way will require only about two-thirds the usual time to print.

Meadville, Pa. E. W. Bowen.

Mixture for Clearing Blue-prints

It very often occurs, when making blue-prints, that a print becomes burned by over-exposure and the lines do not show up well. These may be brought out more clearly by pouring bi-chromate of potash, dissolved in water, over the print while it is in the sink. The print must be washed again with water before it is hung up to dry. HERBERT C. SNOW.

Cleveland, O.

Waterproofing Blue-prints

To prevent the annoyance occasioned by having blue-prints discolored by rain, drippings of mines or other similar exposures, a very simple method of waterproofing them may be effected as follows. The waterproofing medium is refined paraffine. To apply, immerse in the melted paraffine, until saturated, a number of pieces of an absorbent cloth at least a foot square. When withdrawn and allowed to drain for a few moments they are ready for use. Lay one of the saturated sheets on a smooth surface, place the dry print on top of it, and then lay a second sheet of the saturated cloth over it. Iron the top cloth with a moderately hot flat-iron. The paper immediately absorbs the paraffine until saturated, becomes translucent and highly waterproofed, owing to the smooth glossy surface, which is the result of the ironing. The lines of the print will be intensified, and the paper left perfectly smooth and easy to handle. T. E. O'DONNELL.

To Tone Blue-prints

After washing the blue-print in the usual manner, immerse it for half a minute or less in a solution made by dissolving a teaspoonful of potassium bichromate crystals in one-half gallon clear water. Then rinse the print in clear water and hang it up to dry. A galvanized iron or japanned tray may be used for the solution. Prints may be much overprinted and yet give beautiful clear whites and extremely deep blues, easily seen by the workman and a delight to the directors, the latter especially because the solution is quite inexpensive, and can be used over and over again until an objectionable precipitate forms. I have used this toning with Keuffel & Esser's paper and also with a number of local brands of blue-printing paper, all of which gave such fine results that we specify "all blue-prints must be toned."

Denver, Col. F. J. SCHAUFELBERGER.

Spots on Blue-prints

We were bothered for some time with peculiar blue spots on our tracings, which were next to impossible to remove, and which caused spotted blue-prints. The office receiving these prints finally requested us to remove the ink blots from our tracings. The trouble was finally located, in connection with the blue-printing. The one doing this work had a habit of making one print, washing it at once to prove the color, and then printing the entire lot. Now after washing the first print, he did not thoroughly dry his hands, and on placing the next print, the paper was moistened and the exposure "fixed" some of the blue clear through the tracing cloth.

HOWARD D. YODER.

Solution for Cleaning Blue-prints

Dissolve enough bichromate of potash in water to color the water a deep orange—or about one tablespoonful to eight gallons of water. Wash the blue-prints in clear water before and after using the solution.

Chambersburg, Pa. E. RAY CROFT.

How to Save Under-printed or Over-printed Contact Copies

Blue-prints are never so over-printed that they cannot be reduced to a suitable tone by a slightly alkaline bath of borax, bicarbonate of soda, washing soda, or ammonia. Blackline, or "ink" process paper, is usually lost if slightly over-printed; if under-printed it develops too gray all over its surface to be of use for tracing or for reproduction photographically. In the winter-time, when prints from thick paper drawings are apt to be under-exposed, I treated a number of such apparently useless prints with a lotion for throat troubles—the first "tonic" available—with excellent results, the invisible lines developing out a strong black on a gray ground. The mixture was tannin-and-glycerine solution to about 20 parts of water. When using this solution it is safer to under-print rather than to over-print, with the resulting weak or broken lines.

Sepia prints, when much over-printed, can be saved by washing in a very weak solution of hyposulphite of soda which bleaches away the image before it can become fixed by the usual preliminary wash in plain water. The hyposulphite solution is so energetic that it will bleach down the darkest of sepia prints if not previously put in water. Purple tones are obtained, after washing, by treating with any gold-toning bath. CHARLES R. KING.

Staple Hill Park, Bristol, England.

To Bleach Blue-prints

It is occasionally necessary to bleach blue-prints when it is desired to make drawings for photographic reproduction. Blue-prints are sometimes so faded that it is impossible to trace them, in which case I ink the lines of the blue-print and then bleach out the blue, leaving the black lines on the white ground. The process of bleaching is extremely simple and is one that I developed about eight years ago. I had found it impossible to make tracings from blue-prints which were very much faded, or which had been over- or under-printed. After experimenting for a month or so, trying different preparations, I finally hit on the following combination:

1 gallon lukewarm water and ½ pound bicarbonate of soda. Of course this proportion is not exact, and has to be used with caution; when in doubt prepare a little solution and make a test of a small piece before hand as it will be found that some prints will not bleach as others do. Do not allow the inked-in prints to remain in the solution any longer than is absolutely necessary, for no matter how waterproof the ink may be it is impossible to keep it from running a little. Freshly made blue-prints, that is, those not more than a few months old, work best. As soon as the print is bleached take it out of the solution by the corners, being careful not to touch the ink work. Too much soda is harmful as it deposits white dust on the lines. This, however, can be removed by re-immersion in clean water.

New York. FRED DIBELIUS.

Brown-prints

The following solution will change the color of blue-print paper to a dark brown: Borax, 2½ ounces; hot water, 38 ounces. When cool, add sulphuric acid in small quantities until blue litmus paper turns slightly red, then add a few drops of ammonia until the alkaline reaction appears, and red litmus paper turns blue. Then add to the solution 154 grains of red crude gum catechu. Allow this to dissolve, with occasional stirring. The solution will keep indefinitely. After the print has been washed in the usual way, immerse it in the above bath for a period of a minute or so longer than necessary to obtain the desired tone. An olive brown or a dark brown is the result. JOHN B. SPERRY.

Aurora, Ill.

To Save Burned or Over-exposed Blue-prints

Blue-prints that have become burned or over-exposed, may be saved by the use of the following formula: Make a saturated solution of bichromate of potash, and keep a supply on hand in the blue-print room. If a print becomes over-exposed, wash it in the usual manner in a tank or tray of water, after which place it in another tray which should contain a mixture of two parts water to one part of the saturated solution of bichromate of potash. Allow the print to remain in the tray containing the solution until it shows a deep blue color and the white lines are clearly defined (which requires but a few seconds), after which the print should be thoroughly washed and rinsed in clear water. The proportion of the bichromate of potash may be increased or diminished as the occasion requires. This solution also acts equally as well when applied to white-prints made from vandyke negatives. Prints, as well as expense and time, may be saved by the use of the above solution.

Meadville, Pa. J. C. HASSETT.

MISCELLANEOUS DRAFTING-ROOM RECEIPTS

To Preserve Reference Tables

Reference tables are very convenient to use but soon get dirty and torn. To prevent this pour some lacquer in a shallow tray and dip the paper into it and hang it up to drain and dry. This not only makes the paper dirt-proof but toughens it as well. MILTON BURGESS.

Cleveland, O.

To Clean Tracings

Tracings that have become badly soiled from handling or other causes, may be easily cleaned by thoroughly sponging the cloth with benzine or gasoline. Kerosene will serve the purpose, but it is not so good. It does not injure the cloth in the least, but on the other hand has the effect of re-establishing the color of a much used tracing, and will remove pencil marks perfectly. When some compound has been used on the tracing to remove the ink lines, leaving a sticky and gummy surface, benzine will quickly clean and dry the affected portion, so that it can be worked over again. T. E. O'DONNELL.

Olney, Ill.

Chalk Preparation for Tracings

Mix thoroughly one pound of pulverized chalk with one-quarter pound of borax. Rub some of this mixture into a chamois skin, and rub the tracing carefully with this. This preparation is superior to pure chalk. REX MCKEE.

Joliet, Ill.

To Write with Color on a Drawing that is to be Varnished

When it is required to color or to write with color on a drawing or blue-print which has to be varnished later, mix a little isinglass with the color; this will prevent the color running when the size is applied.

Manchester, Eng. H. T. MILLAR.

To Remove Grease Stains from Papers, Drawings, etc.

Place sheets of blotting paper over and under the stained page, to protect the others. Lay powdered magnesia on the stain and under it; then press over the blotting paper with a hot iron. When the powder is shaken off, the stain is gone.

New Britain, Conn. F. L. ENGEL.

To Write on Celluloid

To write on triangles or other instruments made of celluloid use anhydrous acetic acid. The writing will appear dull on the glossy surface. If colored writing is desired, add some coloring matter to the acid. J. M. MENEGUS.

Los Angeles, Cal.

Ideal Method of Preparing Tracing Cloth

It is a well-known fact that neither the glossy nor the dull side of tracing cloth takes ink readily without being prepared in some manner. The usual way is to sprinkle powdered soapstone or chalk on the tracing cloth and rub it over the surface with a piece of cloth. This helps somewhat, but not enough to be perfectly satisfactory. After trying various methods, I have found a way which gives excellent results, and that is, to sprinkle the powdered soapstone on the cloth as usual, but rub it in with a blotter instead of a piece of cloth, using a circular motion and considerable pressure; of course it is necessary to brush away the superfluous powder. The use of a blotter has an abraiding effect and it is just harsh enough to give the cloth a surface which will take the ink readily and still leave the pens unharmed. I find it to be an advantage to repeat this process each morning in case the tracing is not finished the day it is started; the rubbing of the blotter over the lines already inked in does absolutely no harm and if anything makes the lines more dense. A trial of this method will convince the draftsman that the cloth will take the ink better than by any other method.

Chicago, Ill. ROBERT A. LACHMANN.

To Prevent Drawing Titles from Smearing or Rubbing Off

A great many of our railroads and large manufacturing concerns throughout the country are using small printing presses, for the purpose of putting titles on their drawings. It is titles put on in this manner with tracing cloth printing ink to which I refer. After the title has been printed on the drawing, lacquer it over with a very thin coat of French varnish (such as is used by artists). This can be best applied with a chisel-shaped camel's hair brush, equal in width to the height of the letters in the title. A good substitute where French varnish cannot be obtained is made by cutting ¼ ounce of the best grade of white shellac in ½ pint of alcohol. As both of these varnishes dry very quickly, the tracings may be used soon after the titles are put on. E. W. BOWEN.

Meadville, Pa

CEMENTS FOR METALS

To Join Together Two Pieces of Iron that cannot be Heated

I have used a compound consisting of sulphur, 6 parts; white lead, 6 parts; and borax, 1 part. These substances are dissolved in concentrated sulphuric acid, and the surfaces to be united covered with the mastic, and pressed very hard together. In about six days the two pieces are so well joined that even hammering will not part them. J. M. MENEGUS.

Los Angeles, Cal.

Cement for Metals

A very good cement that I have used for cementing metal parts consists of the following ingredients: 2½ parts zinc oxide; 1 part zinc chloride; 5 parts pulverized limestone, slag, etc. Mix to a thick paste, using water. If the cement is wanted to set slowly, add 1 part of zinc sulphate instead of 1 part of zinc chloride. The adhesive power of this cement can be increased by adding 2 per cent of ferrous sulphate to the whole. HERBERT S. GLADFELTER.

Desloge, Mo.

Rust Joint

Mix 10 parts of iron filings, 3 parts chloride of lime with enough water to make a paste. Apply this mixture to the joint, bolt firmly together and in twelve hours it will be set so that the iron will break sooner than the cement. DAVID MELVILLE.

Detroit, Mich.

Cement to Resist White Heat

A cement that will resist white heat may be made of pulverized fire clay, 4 parts; plumbago, 1 part; iron filings or borings free from oxide, 2 parts; peroxide of manganese, 1 part; borax, ½ part, and sea salt, ½ part. Mix these to a thick paste and use immediately. Heat up gradually when first using. W. R. BOWERS.

Birmingham, Eng.

Iron Cement

The following iron cement, if properly prepared and applied, will unite broken iron parts very strongly, and may be found useful oftentimes for repairing broken machine parts of comparative unimportance. Mix equal parts of sulphur and white lead with about one-sixth part of borax and incorporate the three together thoroughly. When ready to use the mixture wet it with strong sulphuric acid and spread a thin layer of the cement on the joint to be united. Clamp together for five days when the joint should be dry and sound.

St. Joseph, Mich. J. W. WILFORD.

Zinc Dust Cement

A putty prepared with zinc dust does not have the drawbacks of those prepared with white lead or red lead. The oil used is that known as wood oil; this oil is extracted from a tree which grows in China and Cochin-China, known as the oil tree or *Elaeococca Vernica*. This putty possesses the peculiar property of hardening under the action of a very moderate heat, such as that which exists in steam boilers. With linseed oil, the hardening takes place at a higher temperature, but it is not as thorough, and a partial oxidation takes place, and it is accompanied by the production of carbonic-dioxid. With wood oil, the hardening is entire and rapid, and a rearrangement of molecules takes place without any chemical change; the physical constitution alone appears to be modified. The hardening of zinc dust cement is quite different from that prepared with white or red lead, as the action of oxygen is not required. Heating to 150 degrees centigrade is sufficient to complete the action, and at 110 degrees it is completed in six hours. This cement will keep for an indefinite period after hardening. ALFRED LANG.

Pittsburg, Pa.

To Unite Metals of any Kind

The following mastic may be used to unite metals of any kind. It becomes very hard. First, mix together well 4 parts of iron filings with 4 parts of chloride of ammonia. Then dissolve 100 parts of arabic gum and 20 parts of sugar in 100 parts of water, and add 1½ part of nitric acid. Boil this, and put the first mixture into it. When the mastic has to be used, mix one part of it with ten parts of new iron filings and some water, and heat it until a paste is formed, which is applied well heated to the pieces to be united.

Los Angeles, Cal. J. M. MENEGUS.

Cement for Locomotive Front-ends

A cement that was commonly used on the Fallbrook R. R. locomotive front-ends some years ago to stop all cracks and leaks, was composed of litharge mixed with sufficient boiled linseed oil to make a stiff paste. Into this paste was thoroughly mixed about one-third bulk of old rope cut into short lengths—about one inch—and separated into its constituent fibers. This cement hardens like iron and the rope fibers hold it together while drying and also prevent squeezing out when the front-end casting is bolted to the smokebox. This cement will be found useful in many other places where it will be subjected to heat.

M. E. CANEK.

CEMENTS AND FILLING FOR CAST IRON

Filling for Cast Iron

One-quarter tumbler full of japan dryer, 1½ ounce finely ground dry white lead. Mix and add 1 quart of finishing japan. Stir in dry rotten stone until mixture is a thick paste. E. H. MCCLINTOCK.

West Somerville, Mass.

Iron Cement

For plugging holes in castings a good cement is made from 80 parts of sifted cast-iron turnings, 2 parts of powdered sal-ammoniac, and 1 part sulphur, made into thick paste with water fresh for use.

Detroit, Mich. DAVID MELVILLE.

Filling for Blowholes in Cast Iron

One part red lead, and 1½ part litharge. Mix with glycerine to consistency desired. E. H. McCLINTOCK.

West Somerville, Mass.

Cement for Iron

Six parts of white lead, 6 of sulphur and 1 of borax, thoroughly mixed and wetted with strong sulphuric acid makes a very strong cement. DAVID MELVILLE.

Detroit, Mich.

Cement for Cast Iron

Mix 1 pound cast-iron filings, 1 ounce sulphur, and 2 ounces sal-ammoniac. Mix thoroughly and keep dry. When using, mix one part of this composition with twenty parts clear filings and some very fine sand. Make into a stiff paste with water.

E. H. McCLINTOCK.

West Somerville, Mass.

Mixture for Making a Porous Casting Air- and Water-tight

To make a porous casting air- and water-tight prepare a saturated solution of copper sulphate, mix with it an equal quantity of commercial nitric acid. Dip the casting into the solution, or pour it over the casting on all sides and let stand for a few hours. L. S. BURBANK

Worcester, Mass.

Alloy for Filling Holes in Cast Iron

Melt together 9 parts of lead, 2 parts of antimony, and 1 part of bismuth, and pour this mixture into the hole, first somewhat warming the hole. This alloy possesses the quality of expanding when cooling, hence becomes solid in the holes when cold.

Dubuque, Iowa. E. J. BUCHET.

To Close Cracks in Castings

The following mixture has been successfully used in filling cracks in gas engine water jackets, and is similar in nature to the ordinary rust joint mixtures. Prepare a dry mixture of 17 parts of cast-iron filings, 2 parts of sal-ammoniac, and 1 part of flour of sulphur; add twenty times the weight of new iron filings, put in a mortar and add water so as to obtain a paste. This paste is applied to the crack, and in a short time becomes as hard as the metal itself. M. E. CANEK.

Cement for Cast Iron

To make a cement for cast iron take 16 ounces cast-iron borings; 2 ounces, sal-ammoniac; and 1 ounce, sulphur. Mix well and keep dry. When ready to use take one part of this powder to 20 parts of cast-iron borings and mix thoroughly into a stiff paste, adding a little water. A. A.

Cement for Holes and Cracks in Castings

A cement for holes and cracks in castings is made of 6 parts red lead, ground in oil; 3 parts white lead, ground in oil; 2 parts black oxide of manganese; 1 part silicate of soda; ½ part litharge. Mix and use as a putty. To preserve from hardening, put in a vessel and cover with water.

Syracuse, N. Y. C. E. MINK.

Water and Oilproof Cement

Some time ago I built a gasoline engine and boat, but when I put the rig on the river I found the engine would run for a short while and then stop. I found that the cause was some sand holes in the cylinder which admitted water into the bore of the cylinder. To stop the holes I used litharge and glycerine mixed into a stiff paste. The cement soon got as hard as iron and I had no further trouble from leakage. I have found that this cement is better than anything else I have ever tried.

Dayton, Ky. ALBERT ELMIGER.

Amalgam for Stopping Leaks, Blowholes, etc.

A small hole or crack that is difficult to get at or that cannot well be soldered may be closed with an amalgam composed of zinc, 66 parts; tin, 44 parts; and sufficient mercury to make a stiff dough. The zinc and tin are to be melted together and afterwards granulated. The latter may be done by slowly pouring the melted mixture through a strong stream of water from a hose nozzle; or the filings may be used. The filings or granules are kneaded until an amalgam of the consistency of stiff dough is formed with the mercury. Excess of mercury should be squeezed out. The plastic mass is then forced into the opening and allowed to harden for an hour or two. It can then be filed and scraped like the metal itself. Only as much amalgam should be mixed as is required for immediate use. O. M. BECKER.

Chicago, Ill.

Mixture for Plugging Holes in Cast Iron

A good mixture for plugging blowholes in cast iron is made of sulphur, cast-iron borings sifted very fine, and graphite. Melt the sulphur in an iron ladle and stir in as much of the sifted borings as the sulphur will allow, not making it too thick to pour readily. Add a small quantity of the graphite, say a tablespoonful to a quart of the mixture. Pour into the holes while hot, and after it is cool smooth off with a file. When holes are filled with this mixture on surfaces to be machined a finishing cut can be taken over it which will obliterate the holes. R. B. CASEY.

Schenectady, N. Y.

Filler for Defective Castings

I recommend the following formula for filling defects and blowholes in castings. I have been using this receipt for years and it is the result of many experiments: 1½ part litharge; 2½ parts dextrine; 4 parts iron borings or turnings carefully sifted. Mix the parts well, add water until the mass is of about the consistency of mortar. With a putty knife or other instrument fill the defective parts and press into every crevice. Let it "set" for 48 hours, when it can be chipped, planed, bored or turned like the casting itself. Color with lampblack to suit the shade of casting.

To facilitate the measuring of parts, use a box of three divisions, made to the following dimensions: The divisions for borings should be 4 inches long, 2 inches wide, 1 inch deep; for dextrine, 4 inches long, 1¼ inch wide, 1 inch deep; for litharge, 4 inches long, ¾ inch wide, 1 inch deep.

York, Pa. W. W. BIRNSTOCK.

CEMENTS FOR PIPE JOINTS

Steam Pipe Cement

Mix equal parts, by weight, of oxide of manganese, pipe clay and white lead, ground with linseed oil varnish.

E. H. MCCLINTOCK.

West Somerville, Mass.

Substitute for Red Lead Applied to Joints

As a substitute for, or in the absence of red lead, use varnish on air or steam pipe joints. It will dry very hard and last for a long time. DONALD A. HAMPSON.

Middletown, N. Y.

Cement for Steam Pipe Joint

A good cement for use in making steam pipe joints is made in the following manner. Grind and wash in clean cold water 15 parts of chalk and 50 parts of graphite. Mix the two together thoroughly and allow to dry. When dry regrind to a fine powder, to which add 20 parts of ground litharge and mix to a stiff paste with 15 parts of boiled linseed oil. The preparation may be set aside for future use, as it will remain plastic for a long time if placed in a cool place. It is applied to the joint packing as any ordinary cement and will be found to last a very long time.

Olney, Ill. T. E. O'DONNELL.

Impermeable Cement for Pipes

To make an impermeable cement for steam, air and gas pipes mix thoroughly powdered graphite, 6 parts; slaked lime, 3 parts; sulphur, 8 parts, and boiled oil, 7 parts. The mixture must be thoroughly incorporated by protracted kneading until it is perfectly smooth and free from lumps.

Dayton, Ohio. O. E. VORIS.

To Make a Water-tight Joint

Take ordinary white lead, and mix enough powdered red lead with it to make a paste the consistency of putty. Spread this mixture on the joint, and when it hardens, the joint will be perfectly water-tight. We used this mixture on flanges on a standpipe, after we had tried all kinds of rubber gaskets without success. The mixture hardened and made a tight joint, never leaking afterward. J. D. PAGE.

Youngstown, Ohio.

Steam-tight Joints

Take white lead ground in oil, add to it as much black oxide of manganese as possible and a small portion of litharge. Knead with the hand, dusting the board with red lead. The mass is made into a small roll and screwed or pressed into position, the joint being first slightly oiled with linseed oil. R. E. VERSE.

Cement for Steam and Water Pipes

A good cement for joints on steam or water pipes is made as follows: 10 pounds fine yellow ochre; 4 pounds ground litharge; 4 pounds paris white (whiting), and ½ pound of hemp cut up fine. Mix together thoroughly with linseed oil, to about the consistency of putty. R. M.

Permanent Iron Cement for Steam Pipes

To make a permanent cement used for stopping leaks in steam pipes where calking or plugging is impossible, mix black oxide of manganese and raw linseed oil, using enough oil with the manganese to bring it to a thick paste; apply to the pipe or joint at leak. It is best to remove pressure from the pipe and keep it sufficiently warm to absorb the oil from the manganese. In twenty-four hours the cement will be as hard as the iron pipe.

Oswego, N. Y. JAMES H. TAYLOR.

Cement for High-pressure Water Pipe Joints

A highly recommended packing and cement, combined, for making tight joints in high pressure water pipes, is made as follows: Mix with boiled linseed oil, to the consistency of putty, these ingredients: ground litharge, 10 pounds; plaster of paris, 4 pounds; yellow ochre, ½ pound; red lead, 2 pounds; cut hemp fiber, ½ ounce. The hemp fiber should be cut in lengths of about ½ inch, and thoroughly mixed into the putty material. Its office is to give consistency to the cement. The cement is applied to the joint similarly to any other cement. It dries thoroughly in from 10 to 12 hours. T. E. O'DONNELL.

Urbana, Ill.

Cements for Iron Joints

The following are cements used to make the joints of machinery air and water tight:

1. Mix ground white lead with one-fourth its weight of red lead.

2. Mix equal parts of red lead and white lead, in powdered form, with enough boiled linseed oil to make the whole a soft, putty-like mass.

3. To 50 pounds of borings, preferably cast iron, which have been pounded and sifted, add one pound of sal-ammoniac. Mix with water when ready to use.

4. Boiled linseed oil and red lead mixed to the consistency required. A small quantity of litharge improves the cement for many purposes.

5. Cast-iron borings 4 pounds, dried potter's clay 1 pound, powdered potsherds (broken crockery) 1 pound. Make into a paste with salt and water.

I have used all of these cements and find them satisfactory. No. 3 is used largely for filling cracks in boilers, etc., and No. 5 is excellent for outdoor iron work, water tanks, etc. F. L. ENGEL.

New Britain, Conn.

CEMENTS FOR ATTACHING CLOTH, EMERY, ETC., TO IRON

To Fasten Paper Labels to Iron or Steel

Rub the surface over with an onion cut in half. Then apply the label with glue or paste. L. E. MUNCY.

Syracuse, N. Y.

Attaching Cloth to Iron

Heat the iron so it will be just too hot to touch with the bare hand, put on a coat of red shellac; have the cloth already cut, applying it quickly, and press firmly in place. JAMES A. PRATT.

Howard, R. I.

Silicate of Soda Cement for Grinder Disks

We use silicate of soda (liquid glass) for fastening emery disks to a disk grinder, and think it is the best cement we ever tried. It requires no haste in applying, and the hotter the disk gets, the tighter it sticks.

Syracuse, N. Y. H. G. HERRICK.

Substitute for Cement or Grinder Disks

A good substitute in place of glue or various kinds of cement for fastening emery cloth to the disk of grinders of the Gardner type is to heat or warm the disk and apply a thin coating of beeswax; then put the emery cloth in place and allow to set or cool under pressure. G. HUBER.

Kansas City, Mo.

To Cement Emery Cloth to Polishing Disk

Apply quickly to the disk with a broad flat brush a coat of moderately thick shellac varnish. Lay on the emery cloth and place under a press at once. The shellac varnish must be clean and without lumps as these may not be pressed down to an even surface and so cause scratches in the work. OSCAR E. PERRIGO.

Neponset, Mass.

To Glue Asbestos or Other Fabric to Iron

One of the most reliable cements or glues to use for attaching asbestos or any other fabric to iron is silicate of soda. It is successfully used for attaching emery paper disks to disk grinders. It is particularly useful for attaching asbestos to furnace pipes, because it stands heat well, and for this reason silicate of soda is an all-around cement of much value. M. E. CANEK.

To Cover Iron Pulleys with Rubber

Thoroughly clean the surface of the pulley; if the pulley has just been turned in the lathe, so much the better. Give it a thorough wash in muriatic acid and let stand over night. In the morning give the iron and rubber a good coat of heavy yellow shellac varnish and apply the rubber and clamp. Let stand until thoroughly set.

Lakewood, Ohio. E. B. GAFKEY.

Cement for Attaching Soft Rubber to Iron or Other Metals

A cement which is effective for cementing rubber to iron and which is specially valuable for fastening rubber bands to bandsaw wheels is made as follows: Powdered shellac, 1 part; strong water of ammonia, 10 parts. Put the shellac in the ammonia water and set it away in a tightly closed jar for three or four weeks. In that time the mixture will become a perfectly liquid transparent mass and is then ready for use. When applied to rubber the ammonia softens it, but it quickly evaporates, leaving the rubber in the same condition as before. The shellac clings to the iron and thus forms a firm bond between the iron and the rubber. M. E. CANEK.

Altay, N. Y.

Cement for Sticking Emery Paper on Small Grinder Disks

Melt together 5 parts paraffine, 4 parts beeswax and 1 part rosin. When cold, cut into blocks, and apply evenly on the revolving disk until it has a thin coat over its entire surface. The emery paper should then be pressed on the disk while it is still revolving, thereby slightly heating both the disk and the paper, and causing the cement to spread in a thin layer all around the disk. The belt should then be shifted onto the loose pulley, so that the paper may be pressed closely to the disk. The corners may then be trimmed off with an old file. It requires a little practice to perform the job successfully, but the method is much superior to removing the disk and gluing the emery paper on in a press. The worn-out paper can be more easily removed, it being only necessary to wait until the disk is cool, when, by taking hold of one portion of the paper, it may be ripped right off. H. J. BACHMANN.

New York.

CEMENTS FOR LEATHER, AND LEATHER AND METALS

A Belt Cement

To make a reliable belt cement use 1 pound of Peter Cooper's white glue and 1 ounce of powdered white lead; mix like ordinary glue (thick). When used it should be thinned to the required consistency with grain alcohol and applied hot. This cement is particularly valuable where long, hard usage is required, such as for dynamo belts. J. H. V.

Belt Cement

Put 15 pounds of best glue in a kettle and pour over it 5 gallons of cold water. Let it stand a few hours or over night in a cold room, after which dissolve by gentle heat. Stir in one pint of Venice turpentine and add one gallon of Martin's belt cement. Cook for four or five hours by gentle heat, being careful not to boil the mixture. A water or steam jacketed kettle should be used to avoid burning. If too thick, mix with water. ALBERT F. BABBITT.

Attleboro, Mass.

Cement for Leather Belts

To prepare a good cement for leather belts, soften equal parts of good hide-glue and American isinglass, in warm water for about 10 hours. Mix the two ingredients together thoroughly and then pour on a quantity of pure tannin and boil until the mass is sticky. Just enough tannin should be added so that the mass will have a good consistency when boiling hot. To apply the cement, roughen the surfaces to be cemented and apply the cement while it is very hot. Press the parts together firmly and hold in that position until dry.

Olney, Ill. T. E. O'DONNELL.

Cement for Leather Belts

To make a cement for leather belts use gutta percha, 16 parts; pure white India rubber, 4 parts; dissolve, and then add pitch, 2 parts; shellac, 1 part; and boiled linseed oil, 2 parts. W. R. BOWERS.

Birmingham, Eng.

Cement for Leather

One ounce shellac, 2 ounces pitch, 2 ounces linseed oil, 4 ounces caoutchouc, 1 pound gutta percha. Melt together and apply hot. E. H. McCLINTOCK.

West Somerville, Mass.

Cement for Belts

Mix 5 ounces bisulphite of carbon with ½ ounce spirits of turpentine, and enough gutta percha to make a paste. Thin the ends of the belt so that when they are joined the thickness at the joint is the same as the thickness of the belt. If the belt ends are greasy, apply some blotting paper and a hot iron to free them from grease. Then apply some of the paste, and press the parts together, using screw clamps and two pieces of board of the same width as the belt. The cement will dry in a short time, when the clamps can be removed. I have cemented belts in this way at night, and in the morning they were as nicely joined as could be wished.

Los Angeles, Cal. J. M. MENEGUS.

Cement for Slicking Leather Fillet on Brass Patterns

Melt together 8 parts pure beeswax and 2 parts rosin; cut into strips when cold and apply with a slicking tool of the proper radius. A piece of wire set into a steel ball, and heated over a Bunsen burner is the best for this purpose. The pattern should be slightly warmed to enable the cement to flow between the leather and brass. When cold any superfluous cement may be removed with a piece of waste soaked in spirits of turpentine.

New York. H. J. BACHMANN.

Cement for Leather Belts

In an ordinary glue-pot soak overnight a pound of good fish glue in a pint of cold water. Heat this up, stirring until completely dissolved. Then add one ounce of dry white lead. When the mixture has been again thoroughly stirred and is nearly cool, add one ounce of grain alcohol, and stir it well in. Heat up the cement again when it is wanted for use. In the use of this cement care should be taken to have the laps freshly and smoothly cut, and as clean as possible. The cement should be evenly spread with a brush over both surfaces and the surfaces placed in contact as quickly as possible, and on each side of the lapped belt should be placed a previously warmed board and the whole clamped together for an hour or two according to the width of the belt, its thickness and the amount of strain it will have to stand. This cement can be made in larger quantities by observing the same proportions, and when cool it may be cut up into small pieces and kept in good condition in a fruit jar tightly closed. When it is wanted it will not be necessary to heat up more than is wanted for the job in hand. OSCAR E. PERRIGO.

Neponset, Mass.

Glue for Leather Belts

Take common glue and isinglass, equal parts; place them in a glue pot, cover with water, let soak 10 hours, bring to a boiling heat, add pure tannin to make to consistency of the white of an egg. Apply warm, have surfaces clean and dry; clamp joint firmly and let dry. L. E. MUNCY.

Syracuse, N. Y.

Cement for Fixing Leather or Paper to Pulleys

Soak six pounds of carriage glue over night; then heat until thoroughly dissolved and add six pounds of white lead ground in oil. Reduce the mixture with oil until it is of a free working consistency. Now add one ounce of nitric acid and stir until thoroughly mixed. The pulley surface should be made thoroughly clean and should be warmed to about 125 degrees F. Then apply the cement and clamp on the leather and let stand twelve hours before using. If the job is done right, the leather will have to be turned off in a lathe in order to remove it.

Lakewood, Ohio. E. B. GAFKEY.

Cheap Cement for General Use

To make a cheap cement for general use, mix gum acacia (pulverized), 1 ounce; French isinglass, 2 ounces; vinegar, 4 ounces; essence of sassafras, 5 drops. After mixing allow it to stand for 12 hours, then heat until thoroughly dissolved when it is ready for use. For covering pulleys with leather, paper, etc., add ½ ounce glycerine to one quart of cement, heat and use while hot. Oily belts can be successfully spliced with this cement by rubbing the scarfed ends with powdered sal-soda and applying a coat of cement, which is allowed to dry; then apply a second coating and put together. J. H. V.

Cement for Leather and Iron

To face a cast-iron pulley with leather apply acetic acid to the face of the pulley with a brush which will roughen it by rusting, and then when dry apply a cement made of one pound of fish glue, and ½ pound of common glue, melted in a mixture of alcohol and water. The leather should then be placed on the pulley and dried under pressure. R. M.

Cement for Holding Leather on Iron Pulleys for Band Saws

First soak twelve ounces of good glue in cold water. Put four ounces of boiled oil and four ounces of turpentine into the glue pot, and in this dissolve three ounces of resin. When the resin is dissolved, add the glue. The resin and glue should be well stirred while dissolving.

Before applying the leather cover to a pulley have it warm and dry, and scrape off all matter that may have accumulated on its face. Then, with a swab, apply muriatic acid (full strength) to all parts of the face of the pulley. When dry, wipe gently with waste. Cut leather lengthwise of hide, and a little wider than the face of the pulley. Have the cement melted in the glue pot, apply it across the face of the pulley, with a brush, for about six or eight inches, lay on the end of leather and rub it down hard with the corner of a piece of wood. Fold back the leather and continue to apply cement until the pulley is covered. Two thicknesses of leather are used. Make the first thickness a butt joint, and the last a scarf or lap joint of about three or four inches long. Make the laps on the driven pulleys the way they run, and on the drivers the opposite way. Pulleys should be cleaned by holding a piece of coarse sand paper against them. R. F. WILLIAMS.

Montreal, Canada.

Cement for Fastening Leather to Iron

To make a good quality of glue for fastening leather to iron, as required when covering iron pulleys with leather, etc., the following will be found to be a good receipt: To one part of glue dissolved in strong cider vinegar add 1 ounce of Venice turpentine. Allow this to boil very slowly over a moderate fire for 10 to 12 hours. It should be applied to the surface of the iron, upon which the leather is to be cemented, with a brush, while it is still quite warm. Before applying, the iron surface and the leather should be scraped perfectly clean. Then put on the leather, press it firmly into place and allow to dry for a few hours.

Urbana, Ill. T. E. O'DONNELL.

CEMENTS FOR ATTACHING GLASS AND MARBLE TO METALS

Cement for Fastening Glass Work to Brass Tubes

A cement for fastening glass work to brass tubes is made of rosin, 5 ounces; beeswax, 1 ounce; and red ochre or venetian red, in powder, 1 ounce.

Birmingham, Eng. W. R. BOWERS.

Cement for Uniting Glass and Brass

It is often necessary, in electrical factories and repair shops, to cement small brass parts to glass. A good cement for this purpose is made from the following: 1 part caustic soda, 3 parts resin, 3 parts plaster of paris, 5 parts water. Boil all the constituents together until thoroughly mixed, and then allow to cool before using. The cement hardens in half an hour. If it is desired that it should not harden so quickly, substitute zinc white, white lead, or slaked lime, for the plaster.

Urbana, Ill. T. E. O'DONNELL.

Cement for Attaching Metal to Glass

To make a cement for attaching metal to glass mix 2 ounces thick glue, 1 ounce linseed oil, ½ ounce turpentine. Boil together for a short time when it will be fit for use. Apply hot with a brush and clamp the parts together for about two days to allow the cement to dry.

R. M. K.

Cement for Fastening Metals to Glass

Melt together in a water bath 15 parts of copal varnish, 5 parts of drying oil, and 3 parts of turpentine. When the ingredients are well mixed add 10 parts slaked lime. An elastic cement for fastening brass to glass may be made by mixing 5 ounces of resin, 1 ounce beeswax, and 1 ounce of red ochre or venetian red in powdered form. Melt the rosin and beeswax together by gentle heat, and gradually stir in the venetian red. W. R. BOWERS.

Birmingham, England.

Cement for Switchboard Repairs

A good cement for making repairs on switchboards, when iron or other metal has to be fastened to marble, or where binding posts have been pulled out, may be made to consist of 30 parts plaster of paris, 10 parts iron filings, and ½ part of sal-ammoniac. These are mixed with acetic acid (vinegar) to form a thin paste. This cement must always be used immediately after being mixed, as it solidifies if allowed to stand for any length of time. It will be found to be an excellent means for filling up old binding-post holes, when instruments have been moved. T. E. O'DONNELL.

Urbana, Ill.

CEMENTS FOR GLUING EMERY, METALS, ETC., TO WOOD

Cement for Fastening Tools in Their Handles

Mix one part beeswax, one part fine brick dust and four parts black rosin.

E. H. MCCLINTOCK.

West Somerville, Mass.

Cement for Gluing Emery to Wood or Metal

The following is a good receipt for gluing emery to wood or metal and I have used it with success where other cements have failed. Melt together equal parts of shellac, white rosin and carbolic acid (in crystals) adding the carbolic acid after the shellac and rosin have been melted. This makes a cement having great holding power. W. T.

To Fasten Rubber to Wood

Make a cement by macerating virgin gum rubber, or as pure rubber as can be had, cut in small pieces, in just enough naptha or gasoline to cover it. Let it stand in a very tightly corked or sealed jar for fourteen days, or a sufficient time to become dissolved, shaking the mixture daily.

Another cement is made by dissolving pulverized gum shellac, 1 ounce, in 9½ ounces of strong ammonia. This of course must be kept tightly corked. It will not be as elastic as the first preparation.

Neponset, Mass. OSCAR E. PERRIGO.

Cement for Joining Metals to Wood

Dissolve in boiling water 2¼ pounds glue, 2 ounces gum ammoniac and drop by drop 2 ounces of sulphuric acid.

Birmingham, Eng. W. R. BOWERS.

Cement for Fastening Emery to Wood

Melt and mix equal parts of shellac, white rosin and carbolic acid in crystals. Add the acid after the other two ingredients are melted. W. R. BOWERS.

Birmingham, England.

CEMENTS FOR MISCELLANEOUS PURPOSES

Shellac Cement

Shellac is the basis of most adhesive cements. A good one is made by thickening shellac varnish (shellac dissolved in alcohol) with dry white lead, mixing the two with a putty knife on a piece of glass.

St. Johnsbury, Vt. W. H. SARGENT.

A Cement for Mending Rubber Goods

Dissolve raw gum rubber or caoutchouc in bisulphide of carbon for a number of days in a tightly stopped bottle until it has the consistency of a thick paste. Make the surfaces to be cemented clean and dry before applying, and press joint tightly together. L. E. MUNCY.

Syracuse, N. Y.

Cement Not Affected by Alcohol

Gold size is valuable as a cement for setting together parts of vessels containing alcohol as it is not affected by alcohol as are some other good cements. It has been used for setting the glass covers of circular levels, the glass afterward being burred over in the brass shell so that it is securely held mechanically. Ordinary painters' size is used, which may be prepared as follows: Boil raw oil in a pan until it smokes, then set it on fire and let burn for a few moments. Cover the pan to extinguish the blaze and pour while warm into a receptacle containing red lead and litharge in the proportion of one ounce of each to a quart of oil. Keep at a temperature of 70 degrees for ten days and agitate once a day. M. E. CANEK.

Acid-proof Cement

Mix a concentrated solution of soda with pulverized glass to form a paste.

Birmingham, Eng. W. R. BOWERS.

Glycerine-litharge Cement

A handy cement to have in the shop for stopping leaks, etc., and which can be used for cementing glass, brass, etc., is made by mixing equal parts of litharge, commercial glycerine and Portland cement. This cement will harden under water and will withstand hydrocarbon vapors.

Dayton, Ohio. O. E. VORIS.

Portland-tar Cement

A valuable cement used in marine practice and other places where elasticity is desirable, is made by mixing Portland cement in gas tar until the consistency is that of stiff putty. It must be applied immediately as it quickly hardens. It is not affected by water and never becomes brittle, a fact that makes it very valuable around the tail-shafts of steamers or wherever there is much vibration. A. L. GRAFFAM.

Hampton, Va.

Waterproof Cements

To make a good waterproof cement in a thin paste form, dissolve 1 ounce powdered resin in 10 ounces strong ammonia and add 5 parts gelatine and 1 part solution of acid chromate of lime. For waterproof cement in paste form, add to hot starch paste one-half its weight of turpentine and a small piece of alum. T. E. O'DONNELL.

Urbana, Ill.

Cement for Arc Lamp Carbons

The short ends of old arc lamp carbons may be cemented together to form rods which burn quite well, and are no more brittle than ordinary carbons. The cement required is made by mixing potassium silicate and carbon dust to a consistency of a thick paste. The ends of the short carbon pieces are faced off square, and, after application of the paste, are pressed together by hand. O. G.

Waterproof Cements for Glass

Probably the simplest and best aquarium cement (the formula for which is recommended by the United States Fish Commission) is made as follows: Stir together by weight 8 parts pulverized putty (dry whiting), 1 part red lead and 1 part litharge. Mix as wanted for use with pure raw linseed oil to a consistency of stiff putty. Allow it to dry a week before using.

Another waterproof cement is made by dry mixing 10 parts each by measure of fine dry white sand plaster of paris and litharge and 1 part powdered resin. Mix as required to a stiff putty with boiled linseed oil. The linseed oil must be free from any trace of adulteration with fish oil. It is sometimes necessary to boil pure raw linseed oil a few moments to drive off the water. A. L. GRAFFAM.

Indiana, Pa.

GLUES AND THEIR PREPARATION

To Waterproof Glued Joints

To render glued joints waterproof, rub common chalk on the surface of the wood where the glue is to be applied, and then coat with ordinary glue in the usual manner. The chalk will protect the glue from moisture so that the joint will hold as well after being soaked in water as before. I tested this method some time ago and found that it works very well. W. S. LEONARD.

Lansing, Mich.

Use of Glue

A mistake not uncommonly made by infrequent users of glue is to break up dry glue in hot water. This is bad practice as the adhesiveness is greatly impaired. Always soak dry glue in cold water and then cook, but do not cook too long, as this is injurious also. Glue that has soured should not be used, and every precaution should be taken to keep it sweet if the best results would be obtained. M. E. CANEK.

Glues Which Resist Moisture

A glue cement that resists moisture is made by mixing with the least possible quantity of water 1 part glue, 1 part rosin and ¼ part red ochre.

Another glue which resists moisture is made of one pint glue melted in two quarts skimmed milk. Add powdered chalk to make it stronger.

A marine glue is made of one part of india rubber, 12 parts naphtha. Heat gently, mix and add 20 parts of powdered shellac. Pour out on a slab to cool. When used it has to be heated to about 250 degrees F. A. L. MONRAD.

New Haven, Conn.

To Make Liquid Glue

Take one quart soft water and 2 pounds of pale glue; dissolve in a covered vessel by the heat of a water bath, cool, and add gradually 7 ounces of nitric acid (specific gravity 1.335). This glue is very strong and will not gelatinize. C. S.

To Prevent Glue Cracking

A useful fact to know in regard to glue when using it on furniture or other work that will be exposed to a very dry atmosphere, is that a small addition of chloride of lime will tend to prevent the glue drying out and cracking. The chloride of lime is strongly hygroscopic and constantly attracts enough moisture from the atmosphere to keep it moist. Use about one-fourth ounce of chloride to one quart of glue.

M. E. CANEK.

ETCHING FLUIDS

Etching Fluid

I have found the following receipt for a fluid for etching steel to be very satisfactory, both for frosting effect and deep etching. Mix 1 ounce sulphate of copper, ¼ ounce alum, ½ teaspoonful of salt (reduced to powder), with 1 gill of vinegar and 20 drops of nitric acid. This fluid can be used either for etching deeply or for frosting, according to the time it is allowed to act. The parts of the work which are not to be etched should be protected with beeswax or some similar substance. S. C.

Liquid for Etching on Steel

The following solution will be found excellent and reliable either for very deep etching upon steel, or for the purpose of producing beautiful frosted effects upon the surface. Mix together 1 ounce sulphuric acid, ¼ ounce alum, ½ teaspoonful salt, ¼ pint acetic acid or vinegar, and 20 drops concentrated nitric acid. The etching effect produced by this solution depends upon the length of time it is allowed to act upon the metal. It is applied in the same way as ordinary etching acid.

Urbana, Ill. T. E. O'DONNELL.

Etching Acid

The various receipts for etching acid to be used on steel in most cases call for two-thirds muriatic acid. I find that the object of the muriatic acid is simply to remove the grease and foreign substance from the steel, and that if only enough muriatic acid is used to accomplish this purpose, the etching acid will work better and quicker. I have used etching acid with muriatic and nitric acids in almost all proportions and have found none so good as two-thirds nitric to one-third of muriatic acid. In some cases I have had good success even with a less proportion of the latter ingredient. GEO. W. SMITH.

Marquette, Mich.

Etching Fluid for Steel

The following receipt for etching fluid for steel, was highly recommended to me, and I have tried it in comparison with another fluid on hardened steel. I found it will make very neat and sharply defined lines, and does the work very quickly:

Nitric acid, 60 parts; water, 120 parts; alcohol, 200 parts, and copper nitrate, 8 parts. Keep in a bottle having glass stopper. To use the fluid, cover the surface to be marked with a thin even coat of wax and mark the lines with a machinist's scriber. Wrap a bit of clean waste around the end of the scriber or a stick, and dipping same in the fluid, apply it to the marked surface. In a few minutes the wax may be scraped off, when fine lines will appear where the scriber marked the wax. The drippings from a lighted wax candle can be used for the coating, and this may be evenly spread with a knife heated in the candle flame. W. S. LEONARD.

Lansing, Mich.

Acids for Etching

Soft Steel.—Nitric acid, 1 part; water, 4 parts.

Hard Steel.—Nitric acid, 2 parts; acetic acid, 1 part.

Deep Etching.—Hydrochloric acid, 10 parts; chlorate of potash, 2 parts; water, 88 parts.

Etching Bronze.—Nitric acid, 100 parts; muriatic acid, 5 parts.

Brass.—Nitric acid, 16 parts, water, 160 parts. Dissolve six parts potassium chlorate in 100 parts of water, then mix the two solutions and apply.

Where the name, initials, or monogram is etched on a tool, for instance a square blade, black asphaltum varnish makes the best "resist." Have a rubber stamp made with the design you wish to etch and stamp the tools with the same, using the varnish as you would ink on the stamp, the stamp having a fancy border around the outside edge. This method leaves the letters or design in relief and makes an unique appearance. E. W. NORTON.

Etching Solution

The etching solution made by the following formula has an advantage over other etching solutions in that it will not rust the most highly polished steel, and it is not in any way injurious to the hands or clothing—as a matter of fact the hands can be dipped into it with no ill effects. Mix 6 ounces distilled water; 4 ounces sulphate of copper, 4 ounces chloride of sodium (common salt); 1 dram sulphate of zinc; ½ dram sulphate of alum. The solution is applied in the following manner: The piece to be marked is covered with melted beeswax, and the inscription to be etched is marked through the wax with a fine pointed tool, leaving the wax undisturbed save where the marking is to appear. The markings are then filled with the fluid and allowed to stand for three hours. The result will be a very sharp and distinct lettering.

Philadelphia, Pa. L. MEYERS.

To Write on Steel

Stamping tools with steel stamps will spring them and throw them out of true. Machinists should write their names on their steel tools using a fluid made of nitric acid 1 part, water 2 parts. Heat the tool gently until some wax that has been put on it melts and spreads thinly over the surface. When cold blacken the wax at a candle; then write on the wax with a steel point deep enough to touch the metal, and cover the writing with the fluid. In about three minutes wash and remove the wax. This fluid, however, will spread more or less and the writing will not be very fine. A better fluid can be made thus: Alcohol 2 parts, nitric acid 1 part, distilled water 15 parts, and nitrate of silver ½ dram per quart of fluid. Nitric acid, however, produces vapors that are disagreeable and harmful. Chromic acid made by dissolving one part of bichromate of potash in 5 parts of sulphuric acid, for this reason is more desirable as an etching fluid, although much slower in its action. J. M. MENEGUS.

Los Angeles, Cal.

Etching on Hardened Steel

First heat an iron or an old pillar file with a smooth side, and with it spread a thin, even coat of beeswax over the brightened surface to be etched. With a sharp lead pencil (which is very much preferable to a scriber) write or mark as wanted through the wax so as to be sure to strike the steel surface. Then daub on with a stick some etching acid made as follows: 3 parts nitric acid; 1 part muriatic acid. If a lead pencil has been used the acid will begin to bubble immediately. Two or three minutes of the bubbling or foaming will be sufficient for marking, then soak up the acid with a small piece of blotting paper and remove the beeswax with a piece of waste wet with benzine, and if the piece be small enough dip it into a saturated solution of sal soda, or if the piece be large swab over it with a piece of waste. This neutralizes the remaining acid and prevents rusting, which oil will not do.

If it is desired to coat the piece with beeswax without heating it, dissolve pure beeswax in benzine until of the consistency of thick cream and pour on to the steel and spread it evenly by rocking or blowing, and lay it aside to harden; then use the lead pencil, etc., as before. This method will take longer. Keep work away from the fire or an open flame. A. S. GUN.

Etching on Copper

For acid resisting ground use a mixture of 2 ounces white wax to which when melted is added 1 ounce gum mastic in powdered form, a little at a time, until the wax and gum are well mixed. Then, in the same way, add 1 ounce powdered bitumen. When this is thoroughly mixed add to it ½ of its volume of essential oil of lavender. This should be well mixed and allowed to cool. The paste can be applied with a hand roller, and if it is too thick, can be made to flow easier by adding a little more oil. When the paste is applied to the copper plate, expose it to a gentle heat in order to expel the oil of lavender. For a biting or etching acid use a mixture of 5 parts of hydrochloric acid, 1 part of chlorate of potash and 44 parts of water. The water is heated and the potash added. The acid is added first when the potash is fully dissolved. This mixture is used by immersing the whole object to be etched, the object, of course, first being covered on all sides by the acid resisting ground. OLIVER E. VORIS.

Dayton, O.

HARDENING AND TEMPERING CARBON STEEL

To Harden Drills for Cutting Glass

To harden drills for cutting glass, dissolve zinc in muriatic acid to saturation, then reduce the solution by adding an equal volume of water. Dip and use without tempering. E. W NORTON.

To Harden Fine Dies

To successfully harden dies for fine work, such as are used by jewelers and others, be careful to have the surface free from all grease or oil, pack face downward in a mixture of equal parts of finely powdered hardwood charcoal and charred bone. Dip in salt water and draw temper to 450 degrees F. HARDENER.

To Prevent Scale in Hardening Fine Dies

It is possible to prevent the formation of any scale in the impression of fine jewelers' dies and the like, and retain the finished brilliancy of surface, by applying a mixture of powdered ivory black and sperm oil, mixed to the consistency of paste. It is only necessary to apply a thin coat. HARDENER.

To Remove Burnt Oil from Hardened Steel

To remove excess oil from parts that have been hardened in oil, place the articles in a small tank of gasoline, which, when exposed to the air, will dry off immediately, allowing the part to be polished and tempered without the confusing and unsightly marks of burnt oil.

New York. H. J. BACHMANN.

Mixture for Hardening Spiral Springs

The following oil bath mixture gives excellent results for hardening spiral springs: Two gallons best whale oil, 2 pounds Russian tallow, and ½ pound rosin. Boil the tallow and the rosin together until dissolved; add the whale oil and stir up well, and then it is ready for use.

Birmingham, Eng. W. R. BOWERS.

To Prevent the Sticking of Hot Lead

To prevent molten lead from sticking to the pot or the tools heated in it, cover the surface with a mixture of powdered charcoal, 1 quart; salt, ½ pint; yellow prussiate of potash, 1 gill; and cyanide of potassium a lump the size of a walnut.

HARDENER.

Removing the Color Due to the Hardening Process

If a punch, reamer or other tool is to be hardened, and the color resulting from that process is undesirable, it may be removed by the following simple method. After the part is hardened, dip it into a glass filled with muriatic acid and allow it to remain for five seconds; then plunge it into a pail of water. In this way the polish of the steel will return and then temper will not be affected. This method is much quicker than obtaining a polish by the use of emery cloth. JOHN C. MONRAD.

Buffalo, N. Y.

Steel Hardening and Tempering Compound

I would submit the following formula as an excellent compound for hardening and tempering steel: To 10 gallons of soft water, add 5 teacups of salt, 6 ounces saltpeter, 12 teaspoonfuls of powdered alum, and 1 teaspoonful corrosive sublimate. We have tempered flat cutters, Acme and U. S. standard taps, counterbores, reamers, etc., to our entire satisfaction, without drawing the temper in any of them.

Columbus, O. H. S. HINDMAN.

To Prevent Lead from Sticking to the Work

To prevent lead from sticking to work that has many small corners or grooves, when heated in a lead bath preparatory to hardening, mix lamp black with water or alcohol to the consistency of paint and apply with a brush. Be sure that the mixture is thoroughly dried out before the piece is dipped into the lead bath.

E. W. NORTON.

Tempering Compound for Steel

The following receipt for a tempering compound I have found very useful when it was impossible to procure a good grade of steel. This compound will be found specially good for cold chisels, center punches, flat lathe drills, etc., and in fact almost any tool not having irregular forms or thin cutting edges. To 6 quarts of good clear rain water add 1 ounce of corrosive sublimate and 2 pints common salt. Stir until thoroughly dissolved. This compound seems to both harden and toughen steel; the tools are dipped and drawn in the usual manner.

Louisville, Ky. HERRMANN G. KROEGER.

To Temper Small Coil Springs

To temper small coil springs in a furnace burning wood the springs are exposed to the heat of the flame and are quenched in a composition of the following preparation: To a barrel of fish-oil, 10 quarts of rosin and 12 quarts of tallow are added. If the springs tempered in this mixture break, more tallow is added, but if the break indicates brittleness of the steel rather than excessive hardness, a ball of yellow beeswax about 6 inches in diameter is added. The springs are drawn to a reddish purple by being placed on a frame having horizontally radiating arms like a star which is mounted on the end of a vertical rod. The springs are laid on the star and are lowered into a pot of melted lead, being held there for such time as is required to draw to the desired color. A. L. MONRAD.

New Haven, Conn.

To Prevent the Accumulation of Foreign Substances on Top of a Hardening Bath

Dust or small globules of oil, which sometimes give trouble by collecting at the top of hardening solutions, can be disposed of by placing a piece of ordinary newspaper on top of the solution; the dirt and oil adhere to the paper and are thus readily removed, thereby avoiding the labor of skimming the bath. EMIL TSCHUDI.

Cincinnati, Ohio.

To Prevent Hot Lead Sticking to Work

About three years ago we had a new quick-break switch to manufacture in large quantities. One piece of the switch was required to be hard at one end and soft at the other. We tried several methods of annealing so as to leave one end hard, but found that the temper was drawn throughout, and all were rejected. We finally decided that a hot lead bath was the only way that would anneal one end and leave the other end hard, but we then encountered the difficulty of the hot lead sticking to the work. A number of receipts were tried for preventing it without success, but finally I discovered a process that is quick and very cheap. Mix common whiting or cold water paint with wood alcohol and paint the part that is to be annealed. The hot lead will not stick, no matter how long the piece is held in the pot. Of course, in the work mentioned, the pieces were lowered quickly into the hot lead and removed as soon as possible, in order to prevent drawing the temper of the hard end, and then the whole was plunged into a pail of cold water. Water will do as well as alcohol to mix the paint, but alcohol is the most convenient inasmuch as it can be used without waiting for the paint to dry. If water is used, the paint must be thoroughly dry, as otherwise the moisture will cause the lead to fly. E. J. LAWLESS.

Pittsfield, Mass.

To Heat the Tips of Small Tools

Sometimes it is necessary to heat, for the purpose of hardening or annealing, the tips of small tools, such as countersinks, etc. To do this without heating other portions of the tool is at times difficult to accomplish. If the tool is inserted into a raw potato, exposing only the part to be heated, the operation is easily performed.

South Portland, Me. J. V. N. CHENEY.

Hardening Bath

To make an excellent hardening solution, mix pure rain water and salt strong enough to float a raw potato, and to twenty gallons of the brine add three pints of oil of vitriol. Tool steel may be hardened at a surprisingly low heat in this solution, a very great advantage, of course, when hardening difficult shapes. The solution, however, has one slight disadvantage in that it causes the steel to rust quickly unless the steel is thoroughly scrubbed in strong hot soda water immediately after hardening. Tools hardened in this solution should come out of the bath a beautiful silver gray color, and if there are any black spots they are likely to be soft. I. W. ANTANO.

Hardening Compound

In hardening small tools, some of the more delicate and essential parts of the tool to be tempered are very apt to be overheated and burned unless extraordinary care is exercised. The following is descriptive of a compound that can be used to prevent over-heating of such small delicate instruments during the process of tempering. Dissolve 2 ounces of pure castile soap in enough warm water to make a thin paste, and add to it the contents of a five-cent package of lamp black, mixing it well into a stiff paste. This must be kept securely sealed in a can. To use the compound, slightly warm the small tool or object that is to be hardened, and smear the paste all over it. When dry, heat and quench in the usual way. As the paste is removed by the bath, the work will be clean enough to observe the color in tempering. T. E. O'DONNELL.

Urbana, Ill.

Hardening Formula for Cutting Tools

To make a hardening solution for metal cutting tools mix saltpeter, 2 ounces; salamoniac, 2 ounces; alum, 2 ounces; salt, 1½ pound; and soft water, 3 gallons. Keep the solution in a stone jar, for it will eat a wooden tub and rust an iron pot. Do not draw the temper but only warm the tools enough to relieve the hardening strains. It is also well to rinse the tools well in water, for if this is not done, the solution will rust them. TOOLMAKER.

Preparation for Producing Extreme Hardness in Steel

The steel to be hardened should be immersed in a mixture of 4 parts of water, 2 parts of salt, and 1 part of flour. To get the steel thoroughly coated it should be slightly heated before dipping in the composition. After dipping, it is heated to a cherry red and plunged in soft water. This will make the steel harder than if simply heated and dipped in water. S. C.

To Harden Steel Without Scaling

Articles made of tool steel and polished may be hardened without raising a scale, thereby destroying the polish, by the following method: Prepare equal parts in bulk of common salt and fine cornmeal, well mixed. Dip the article to be hardened first into water, then into the mixture and place it carefully into the fire. When hot enough to melt the mixture, take from the fire and dip or roll in the salt and meal, replace in the fire and bring to the required heat for hardening. Watch the piece closely and if any part of it shows signs of getting "dry" sprinkle some of the mixture on it. The mixture, when exposed to heat, forms a flux over the surface of the steel which excludes the air and prevents oxidation, and when cooled in water or oil comes off easily, leaving the surface as smooth as before heating. Borax would possibly give the same result, but is sometimes difficult to remove when cold. E. C. NOBLE.

Rock Falls, Ill.

A Tempering Solution

A tempering solution used for high heats may be composed of two parts Chili saltpeter and one part nitrate of soda. This tempering solution is used only at high temperatures, as it becomes solid at about 500 degrees F. It is used in place of tempering oils, as they often thicken after short use, and will flash or ignite at about 600 degrees F., and often at a lower temperature. It should be used in connection with a tempering furnace, the heat being gaged by a thermometer. The thermometer should be removed when the day's work is over. At night, two iron plugs, with a fairly liberal taper per foot, and long enough to reach from the inside bottom of the tank containing the bath, to about four inches above the top of the solution, should be placed vertically with the small end of the taper down, and some little distance apart. These should be permitted to stay in the solution when it solidifies. On the following morning, these iron plugs should be unscrewed and removed. The holes left in the solidified solution by these plugs afford an escape for gases that form in reheating the bath. E. S. WHEELER.

Alloys for Drawing Colors on Steel

Alloys of various composition are successfully used for drawing colors on steel. To draw to a straw color use 2 parts of lead and 1 part of tin, and melt in an iron ladle. Hold the steel piece to be drawn in the alloy as it melts and it will turn to straw color. This mixture melts at a temperature of about 437 degrees F. For darker yellow, use 9 parts of lead to 4 parts of tin, which melts at 458 degrees F. For purple, use 3 parts of lead to 1 part of tin, the melting temperature being 482 degrees F. For violet, use 9 parts of lead to 2 parts of tin, which melts at 594 degrees F. Lead without any alloy will draw steel to a dark blue.

Cleveland, Ohio. MAX DEHNE.

HEAT TREATMENT OF HIGH-SPEED STEEL

To Anneal High-speed and Air-hardening Steels

To anneal "Novo" or "Blue Chip" high-speed steel or any of the air-hardening steels, pack the steel in a piece of gas pipe with powdered charcoal, and seal the ends with clay or caps screwed on. Heat to a cherry red, giving time for the contents of the pipe to reach this temperature, and then set in a dry, sheltered place to cool. The steel will be found annealed so that it can be readily drilled, turned, planed or worked as required.

A. A. STEVENSON.

Bath for Hardening High-speed Steel

An excellent bath for hardening high-speed steel consists of a mixture of table salt and paraffine oil, in the proportion of one pound of table salt to each gallon of pure oil. The steel is heated to a lemon color, and plunged into the bath, being kept in motion until it has thoroughly cooled. The steel should come out of this bath gray in color, and nearly free from black spots. The bath referred to can be used for almost all brands of high-speed steel, with good results. It has been used to great advantage for the Midvale steel, and also on a large number of tools made of Novo, Simeteora, Rex, Jessop high-speed, and Blue Chip steel. On all these, good results have been obtained, but it may be added that this bath seems to give the best results with the Midvale steel. H. S. STEEL.

Paste for Hardening High-speed Steel

The hardening paste made according to the following receipt has been used on high-speed steel with success, enabling it to be hardened by heating in an ordinary gas oven, and thus making unnecessary the very high heat usually called for in hardening such steels. Mix 2 pounds rye meal; 1 pound common salt; ¼ pound pulverized borax; ¼ pound pulverized charcoal; 1-3 pint (or ½ pound) liquid cyanide of potassium; ½ gill or 2 ounces of water glass (silicate of soda); and 3 pints of water. The liquid cyanide is made by dissolving 3 ounces of pulverized potassium cyanide in one pint of boiling water. Mix thoroughly to form a paste.

When using this paste I have found it best to apply it in the following manner: Provide a small cast-iron vessel or a crucible of the shape of a drip-pan, and spread a thin layer of the paste on the bottom; put the work in the pan and cover that with paste also. Place work and pan in the gas oven and heat until it reaches a nice full red. Dip in sperm, fish or kerosene oil. JOS. M. STABEL.

Rochester, N. Y.

CASE-HARDENING

Case-hardening Process for Cold Rolled Steel

To successfully case-harden common cold rolled steel so that it will answer for the cutters of inserted reamers, etc., pack the cutters in granulated raw bone in a cast iron box with at least one-half inch layer of bone between the cutters and the sides of the box. Put on an iron cover and lute with fire-clay; heat in a gas furnace to almost a white heat for from two to five hours according to the size of the box. Then draw the box, open and dump quickly into a bath composed of the following: 1 quart of vitriol (sulphuric acid), 4 pecks common salt, 2 pounds saltpeter, 8 pounds alum, 1 pound prussiate potash, 1 pound cyanide potash and 40 gallons soft water.

S. Pittsburg, Pa. F. WACKERMANN.

Formula for Case-hardening Preparation

Yellow prussiate of potash, by weight, 7 parts; bichromate of potash, 1 part; common salt, 8 parts; pulverize the crystals and mix thoroughly. Heat the piece to be hardened to a dark red and dip into the preparation or sprinkle it on the piece. Return to the fire and let it soak, then repeat several times according to the depth of hardened surface wanted. Finally plunge into water or oil. This may be used on tool steel, soft steel or iron.

Meriden, Conn. JAMES P. HAYES.

Mottled Case-hardened Articles

There are several ways of obtaining the beautiful mottled effect on case-hardened articles, but one of the simplest and most effective methods is in use in the factory of the Thos. B. Jeffery Co., Kenosha, Wis. Here the usual cooling tank and screen for catching the work are in use, but in addition, an air pipe is run into the bottom of the tank in such a way that when the air is turned on the water is filled with air bubbles and is violently agitated. The result of these air bubbles striking the cyanide-coated articles during the cooling process, is some of the prettiest mottled work imaginable. E. V.

To Mottle Case-hardened Pieces

A simple and effective way to get a mottled effect in case-hardening with cyanide of potassium is as follows: Set an open pail or jar under a running hydrant, get the pieces good and hot (bright red) in a ladle of molten cyanide, then take out singly with tweezers and simply throw them into the water. The air bubbles rising through the water give the desired mottled effect. A still better process, if an air blast is at hand, is to connect a rubber hose in some manner to the bottom of the pail, so that a stream of air enters the water. This plan serves well where no special appliance is available for this class of work.

Chicago, Ill. HARRY ASH.

Good Case-hardening Mixtures

One part sal-ammoniac and 3 parts prussiate of potash; or, 1 part prussiate of potash, 2 parts bone dust and 2 parts sal-ammoniac. E. H. McCLINTOCK.
West Somerville, Mass.

To Case-harden a Piece Locally

To case-harden part of a piece to a line or in a spot cover the part or surface to be hardened with a moderately heavy coat of black japan enamel. I prefer this as it bakes on more closely than anything else. Clean the work thoroughly, then put on a heavy coat of copper and the work is now ready to be carbonized, and is packed in a pot in bone or leather in the usual manner. Heat long enough to give the required depth of "case." Then take out of the fire and cool down in the pot. When cold reheat and dip in oil or water. The copper blocks the absorption of carbon while the japan burns off and allows the carbon in the bone or leather to be absorbed by the iron.
E. W. NORTON.

To Case-harden for Colors

Mix 10 parts charred bone, 6 parts wood charcoal, 4 parts charred leather and 1 part of powdered cyanide potassium. Clean the work thoroughly, and do not handle with greasy hands. Pack the work with the mixture in a common gas pipe plugged at one end, and seal at the other with asbestos cement. Heat in a furnace to a dark cherry red and keep at that heat for about 4 or 5 hours. Dump in a tank with compressed air bubbling up through the bottom. If the colors are too gaudy leave out the cyanide. J. F. SALLOWS.
Grand Rapids, Mich.

Partial Case-hardening

The entire surface of the work, or that part which is to be hardened, should be coated with a moderately heavy coat of japan enamel, and then a medium heavy coat of copper should be applied to the remaining portion of the work. In applying the copper, care should be taken not to disturb the japan. After the copper is applied, the piece is ready to be carbonized. It should be packed, and heated to a bright red, and held at this heat long enough for the requirements of the work. Then the box or case, containing the pieces to be case-hardened, are taken out of the fire and the work is permitted to cool in the box. When cool, the work is taken out and reheated in the open fire, and dipped in oil or water. The copper prevents the absorption of the carbon, while the japan enamel burns off and allows the carbon to take effect. E. S. WHEELER.

ANNEALING STEEL AND OTHER METALS

Annealing Steel

Cover the steel with fire clay, and heat to a red heat. Then allow the steel to cool over night in a furnace or forge. This method will prove satisfactory when other means fail. SAMUEL H. OWENS.
Rockford, Ill.

To Anneal Steel or Iron

Smear the iron or steel with tallow, and heat slowly in a charcoal fire until it is a dark red. Allow it to cool itself. This method is all right for very hard tool steel. R. B. CASEY.
Schenectady, N. Y.

Annealing Steel

Heat slowly or rather evenly to a dull red heat. Put it in a dark place or corner, box or barrel, until all signs of red have just disappeared, then quench in water, taking care to hold it still. When annealing flat stock, heat evenly and thoroughly, place between two planed pine boards on an ash heap and cover with ashes. By this method the charcoal is produced, so to say, automatically. WM. B. BROOKS.
New Kensington, Pa.

To Anneal Finished Copper

To make a mixture for protecting finished copper pieces which require annealing mix to a thick consistency white cold water paint and alcohol and apply to the copper with a brush. Allow the mixture to dry and then heat to a low red by dipping into pure melted lead at the required temperature. Cool in air or water, preferably the latter. L. C. CARR.
Lynn, Mass.

Annealing Steel Having Hard and Soft Spots

To anneal steel having hard and soft spots, remove the scale, and heat slowly and evenly to a little above a dark red. Immerse in fresh water until almost cool. Heat immediately to a dark red and anneal in the usual way. C. P. EMERSON.

To Anneal Zinc

In working zinc the greatest loss is on account of the zinc cracking and being too brittle to handle to advantage. It is surprising to find how very few mechanics understand the annealing or malleabilizing of same. The following will be found unfailing: Heat in oil to about 500 degrees F. and plunge in hot soda water, which works the double operation of drawing the zinc to the proper degree and at the same time cleanses the surface from the oil.

HARDENER.

METHODS FOR HEAT TREATMENT OF CAST IRON

Chilling Cast Iron

Mix together ½ pint of oil of vitriol, 2 ounces of saltpeter, and 3 gallons of clean water. Heat the casting, and plunge it in this solution, keeping it there until cold.

Dayton, O. GEORGE E. HETZLER.

To Soften Hard Cast Iron for Drilling

Heat to a cherry red, allowing it to lie level in the fire. Then with a pair of cold tongs put on a piece of sulphur a little less than the size hole to be drilled. This will soften the iron entirely through, providing it is not too thick. O. E. VORIS.

Dayton, O.

Case-hardening Cast Iron

To successfully case-harden cast iron, the pieces to be hardened should be heated to a red heat, then rolled in a composition of equal parts of prussiate of potash, sal-ammoniac and saltpeter. All pulverized and thoroughly mixed. Every part of the casting must be covered by the composition before plunging (red-hot) into a bath of 2 ounces prussiate of potash and 4 ounces sal-ammoniac to each gallon of cold water. A.

To Case-harden Cast Iron

To case-harden cast iron use a pot of suitable size for the piece, packing it in with 2/3 raw bone and 1/3 charcoal ground to about the same size as the bone. Seal the pot cover with fire-clay and place in a furnace and run it about 5 hours. Then take out the work and dip in oil or water.

E. W. NORTON.

To Case-harden Cast Iron

I have successfully case-hardened cast iron, using the following receipt: Pulverize and mix together equal weights of saltpeter, prussiate of potash and sal-ammoniac. Make a dipping solution by adding to each quart of cold water 1 ounce prussiate of potash and ½ ounce sal-ammoniac Heat the cast iron pieces till red-hot, roll them in the powder, and then plunge them into the liquid.

Los Angeles, Cal. J. M. MENEGUS.

To Toughen and Surface Harden Cast Iron

To toughen and surface harden small cast iron machine parts, which are subjected to wear, such as small gears, cams, etc., heat to a dull red and quench in a saturated solution of cyanide of potash and water which should be kept as near boiling point as possible. This can be accomplished best by putting the solution in an iron pot near the fire in which the parts are being heated. J. H. V.

To Harden Cast Iron

To harden cast iron take ½ pint vitriol (sulphuric acid), 1 peck common salt, ½ pound saltpeter, 2 pounds alum, ¼ pound prussiate potash, and ¼ pound cyanide potash, dissolve in 10 gallons of water. Heat iron to a cherry red, dip, repeating until hard enough. W. T. SEARS.

Harrisburg, Pa.

Hardening Cast Iron

The following process can be used for hardening cast iron whether rough or after machining. The casting is first heated to a cherry-red heat; it is then dipped in a bath which consists of a practically anhydrous acid of high heat-conducting power, preferably sulphuric acid of a specific gravity of from 1.8 to 1.9, to which is added a suitable quantity of one or more of the heavy metals or their compounds—such, for example, as arsenic or the like. The preferable ingredients of the bath are sulphuric acid of a specific gravity of approximately 1.84 and red arsenic in the proportions of ¾ pound of red arsenic crystals to 1 gallon of sulphuric acid. The castings may be either suddenly dipped in the aforementioned mixture, and then taken out and cooled in water, or they may be left in the bath until cool. In preparing the bath, when sulphuric acid and red arsenic are used, better results are obtained when the crystals are added to the sulphuric acid and the bath is allowed to stand for about a week before using. O. G.

To Anneal Iron Castings

Iron castings that are too hard to machine or which have hard spots destructive to tools may be nicely annealed by packing closely in covered cast iron boxes with black manganese, and heating to a temperature of 1,500 or 1,600 degrees F., until thoroughly heated through. A large box packed in this manner with a closely-fitted cover luted with fire-clay must be heated for several hours to raise the interior to the annealing temperature. To be sure of getting the interior heated properly, a number of witness wires should be placed in the box, projecting through the cover where they can be conveniently grasped with tongs and pulled out one at a time to show how far the heat has progressed. When the interior has reached a bright red heat the box should be hauled out and covered with ashes so that it will cool slowly. It is claimed that hard spots in gray iron castings can be softened with black manganese by applying the manganese and heating to a dull red, using a blow-torch or any other convenient means of heating. M. E. CANEK.

POLISHING BRASS, NICKEL AND STEEL

Compound for Cleaning Brass

To make a brass cleaning compound use oxalic acid, 1 ounce; rotten stone, 6 ounces; enough whale oil and spirits of turpentine of equal parts to mix and make a paste. G. E. HETZLER.

Dayton, Ohio.

To Remove Bluing from Tempered Steel

Plunge the blue hot article into a bath of sulphuric acid 1 part, water 16 parts; then into a bath of lime and water (to neutralize the acid) and rub it off quickly with a dry cloth and Vienna lime. The result will be a most beautiful polish.

Angelica, N. Y. F. H. JACKSON.

Polish for Brass

An excellent liquid polish for articles of brass may be made as follows: Add together and mix thoroughly, 100 parts of powdered pumice stone, 2 parts oil of turpentine, 12 parts soft soap and 12 parts of fat, oil or lard. When thoroughly mixed, add the mixture to a solution of 3 parts oxalic acid dissolved in 40 parts of hot water. Stir well until a uniform paste is formed. Apply to surface of any article of brass, by means of a cloth, rubbing it in well. Remove remnant and polish with a clean, dry cloth. T. E. O'DONNELL.

Urbana, Ill.

Compound for Polishing Brass

To 2 quarts of rainwater add 3 ounces of powdered rotten stone, 2 ounces of pumice stone and 4 ounces oxalic acid. Mix thoroughly together and let it stand a day or two before using. Shake it before using and after application polish the brass with a dry woolen cloth or chamois skin.

DONALD A. HAMPSON.

Middletown, N. Y.

Unchanging Gloss on Cast Iron

The articles ar well scrubbed with a diluted acid, dried and smoothed with a file, wire brush or the like. Then they are rubbed repeatedly with ordinary crude petroleum and let dry each time; finally they are well rubbed with a hair brush, which gives them a dark glossy appearance which will stand heat and serve as protection against rusting. Articles once treated in this manner need later on be only rubbed with petroleum and brushed up again. D.

Metal Polish

A good metal polish for gold, silver, brass, nickel, etc., can be made by taking powdered crocus and mixing enough kerosene oil with it to make a paste. This paste must be rubbed very thoroughly over the article to be polished. Then take a flannel cloth and rub lightly and rapidly until a brilliant polish is obtained.

Cleveland, O. HERBERT C. SNOW.

A Nickel Buff

For buffing nickel work, there is nothing that will give a luster equal to Vienna lime composition. It can be made by the user, but it is more satisfactory to buy it of the manufacturer, as when homemade it air-slacks very rapidly; it is put up by the makers in air-tight cans of about one pound each, and this shape will keep until used up. It is also a good buffing composition on brass or other metals where there is not much cutting down to do, as it will cut down and color in one operation. If there is much cutting down, go over the work first with tripoli, then color with rouge or lime. All these compositions are put up in different grades for fast cutting, and also for dry or greasy work.

Bridgeport, Conn. J. L. LUCAS.

Cleaning the Polished Parts of Machinery

Stains of every description, such as may result from dried oil, etc., may be easily and effectively removed by the application of alcohol. CALVIN B. ROSS.

Springfield, O.

Metal Polish

Get two or three oyster or clam shells and burn them on clear coal fire for fifteen or twenty minutes; then powder them in a mortar. This makes a superior metal polish. It is the best thing I have ever used for polishing silver and gold articles, and if finely pulverized can be used on the most delicate article without injury.

Joliet, Ill. REX MCKEE.

Polish for Brass—Polish for Steel

A good polish for brass is made by putting 2 ounces of sulphate of nickel and 2 ounces of nitric acid in an open vessel and allowing them to mix thoroughly. Then add water.

To make a polish for steel dissolve 2 ounces each of oxalic acid, pumice stone, ammonia, and whiting in a quart of water.

New York. HERMAN JONSON.

Liquid Metal Polish

A good liquid metal polish for cold smooth surfaces, either iron or brass, may be made from the following ingredients: To 3 parts of benzine add 2 ounces of oxalic acid and 1½ pound of silicate acid powder. This polish may be made in large quantities and set aside for further use provided it is kept in tightly closed bottles, and shaken well before using. Apply the solution with a piece of cloth. When dry, polish with a soft, clean cloth.

Urbana, Ill. T. E. O'DONNELL.

To Polish Nickel Plate

Apply rouge with a little fresh lard or lard oil with a piece of buckskin. Rub the bright parts, using as little of the rouge and oil as possible. Wipe off with a clean cloth slightly oiled. Wipe every day and polish as often as necessary. This is also an excellent preventative of rust.

DONALD A. HAMPSON.

Middletown, N. Y.

Paste Metal Polish

A paste metal polish that is good for any smooth surface, whether hot or cold, can be obtained from the following ingredients, which will make about 20 pounds of the polish: 2 ounces of spermaceti, 4 ounces of cake tallow, 10 star candles, 2½ pints of raw linseed oil, 2½ pints of kerosene, and 5 pounds of tripoli powder. Procure a crock that will hold 3 or 4 gallons. Put in the tallow, spermaceti and candles, and melt over a slow fire. Then add the linseed oil and kerosene, and stir well. While this mixture is still warm, remove from the fire, and add the tripoli powder very slowly while constantly stirring the mixture. When all the powder has been added, allow to cool. To use, apply with a soft cloth, and after drying, remove the remnant and rub the surface with a piece of soft flannel. T. E. O'DONNELL.

Urbana, Ill.

PRODUCING BLUE OR BROWN COLORS ON STEEL

To Produce Brown Finish on Steel

To produce the rich brown finish that is commonly used on large guns use sulphate of copper, 1 ounce; sweet spirits nitre, 1 ounce; distilled water, 1 pint.

Four coats are applied, allow several hours to elapse between the successive coats, brushing after each if necessary. After the last coat rub down hard and allow to dry 24 hours. This gives a reddish-brown color without gloss. By adding arsenic to the mixture before last coat a deeper hue is obtained. The polish is obtained by means of a mixture of boiled oil, beeswax, and turpentine, comparatively thick. Rub in well with cotton cloth and finally with the palm of the hand.

R. P. PERRY.

To Blue Steel Without Heating

To blue steel without heating it, connect a small steam pipe to a wooden box so that steam may flow continuously into it. Put a bath of the following ingredients in the box: Iron chloride (muriatic tincture of steel), 1 ounce; alcohol (spirits of wine), 1 ounce; corrosive sublimate (mercury bichloride), ¼ ounce; aquafortis (strong nitric acid), ¼ ounce; blue stone (copper sulphate), ⅛ ounce; and water, 1 quart. The vapor arising from this mixture forms a deposit on the articles. After having been exposed to the vapors for a number of hours, they are rubbed off with cloth, and the operation repeated if a darker hue is required. W. J. KAUP.

Bluing Iron or Steel

Mix one part clean sand with one part powdered charcoal, heat the whole evenly in a pan or convenient receptacle until the piece, which has first received its finishing polish and been covered by the mixture, comes to the desired color. When cool, wipe dry with cloth. NERALCM.

Steel-blue Enamel

A steel-blue enamel suitable for applying to steel and also other metals to give them a steel-blue polished surface, may be made in the following way: Dissolve 1 part of borax in 4 parts of water. Macerate 5 parts bleached shellac in 5 parts of alcohol. In a small quantity of alcohol dissolve some methylene blue of sufficient amount to give the color desired. Heat the first or watery solution to boiling, and while constantly stirring add the alcoholic solution. Stir until all the lumps are dissolved, and then add the blue solution. Before applying, the surface to be blued should be cleaned and brightened with emery cloth. The enamel is best applied with a soft brush. The solution may be put into a bottle and set aside for future use, provided the bottle is securely corked.

Olney, Ill. T. E. O'DONNELL.

To Blue Gun Barrels

To blue gun barrels and other pieces dissolve 2 parts of crystallized chloride of iron; 2 parts solid chloride of antimony; 1 part gallic acid in 4 or 5 parts of water; apply with a small sponge, and let dry in the air. Repeat this two or three times, then wash with water, and dry. Rub with boiled linseed oil to deepen the shade. Repeat this until satisfied with the result.

New Britain, Conn. F. L. ENGEL.

PRODUCING BLACK COLOR ON IRON AND STEEL

To Give Iron a Black Color

To give iron a dead black color, clean all grease and dirt from the metal, and apply the following solution either with a brush or by dipping. Mix together thoroughly 1 part bismuth chloride, 2 parts mercuric bichloride, 1 part copper chloride, 6 parts hydrochloric acid, 5 parts alcohol and 52 parts water. As soon as these parts are thoroughly mixed, the compound is ready for use. After applying the compound, the iron is placed in boiling water and allowed to remain for one-half hour, the water being kept at the same temperature. Repeat this operation until the color is deep enough, then fix the color by placing the iron for a short time in a bath of boiling oil. After removing, heat in an oven until the surplus oil is all driven off.

Urbana, Ill. T. E. O'DONNELL.

Black Oxide Coat for Steel

A fine black coat is produced on steel if treated in the following manner: An oxidized skin is first produced in some suitable manner on the surface of the steel; this is converted into black oxide by means of hot water and continued until the coat of oxide is thick enough. Then the articles are dipped in lukewarm water to remove any acid or salty particles, and then some olive oil is poured over the whole. D.

Black Finish for Steel

The pieces to be blackened should first be polished with No. 120 emery cloth. After polishing, the surfaces should be cleaned carefully, and then the work placed over the fire and drawn evenly to a second blue. Then, the work is dipped in lard or sperm oil, from which it is immediately removed, and all loose oil shaken off. This prevents the forming of blisters. An old piece of rubber, for instance a piece of old garden hose, is then placed on the fire, and as it burns, the work is held over the flame and smoke that comes from the rubber, until it is covered with a thick coat of black soot. The work is then removed from the fire, and permitted to cool off slowly. When cool, it is rubbed with an oiled cloth. All this must be done in one heat.

Tarrytown, N. Y. E. W. NORTON.

To Blacken Articles which are not Soldered

Heat the article to a low heat and dip into a solution of nitrate of copper, made by dissolving copper in nitric acid. Then heat the piece dipped over a spirit lamp or Bunsen burner until from greenish color it finally turns black. H. A. SHERWOOD.

Bridgeport, Conn.

To Make Black Marks on Graduated Surfaces

The scale is varnished over with a little thin shellac varnish, so as to sink into all the cuts. When this is dry, a black varnish of lampblack and shellac is spread on, so as to fill all the cuts. This is allowed to *thoroughly dry*. When hard, the work is driven in the lathe, and the superfluous varnish polished off with fine flour emery cloth until only that in the cuts is left. This gives a very distinct marking and fine finish to scale. F. H. JACKSON.

Angelica, N. Y.

LACQUERS AND ENAMELS FOR STEEL

Lacquering Effect on Polished Steel

Mutton suet burnt on a polished surface produces a brilliant black which is very lasting. H. T. MILLAR.

Manchester, Eng.

Bronzing Fluid for Steel

To obtain a light bronzing fluid use nitric acid, 6 parts; nitric ether, 5 parts; alcohol, 5 parts; muriate of iron, 5 parts. Mix thoroughly and then add 10 parts sulphate of copper dissolved in 50 parts of water. O. G.

Enamel Glaze for Coating Iron Pans

To prepare an enamel glaze for coating iron pans use flint glass, 130 parts; carbonate of soda, 20.5 parts; boracic acid, 12 parts. Dry at a temperature of 212 degrees and then heat to redness and anneal, that is, cool down very slowly.

Birmingham, Eng. W. R. BOWERS.

Enamel for Iron or Steel

Make an enamel by mixing 2 ounces of burnt umber with 1 quart boiled linseed oil, heating, and then adding 1 ounce asphaltum. Keep hot until thoroughly mixed, and thin with a small quantity of turpentine. Have the surface of the parts to be enameled thoroughly cleaned, and apply the enamel with a camel's hair brush, and allow it to set. Then place in an oven and bake for 6 hours, at a temperature of 250 degrees F. When cool, rub down with steel wool, and then apply the finishing coat of the desired color, and allow to bake for 6 or 8 hours. Rub down, when cool, with a soft cloth, then varnish and bake again at 200 degrees F. The heating and cooling should be done gradually each time so as not to crack the enamel. Black enamel usually requires a higher degree of temperature than any other kind, or about 300 degrees F.

Urbana, Ill. T. E. O'DONNELL.

PRODUCING COATINGS OF COPPER OR BRASS ON IRON

To Brass Small Articles

To brass small articles of iron or steel drop them into a quart of water and ½ ounce each of sulphate of copper and protochloride of tin. Stir the articles in this solution until desired color is obtained.

R. M.

Brassing Iron

Iron ornaments are covered with copper or brass by properly preparing the surface so as to remove all organic matter which would prevent adhesion, and then plunging them into melted brass, or copper. A thin coating is thus spread over the iron, and it admits of being polished or burnished. The better the article is finished and cleaned before dipping, the better will be the final result. R. B. CASEY.

Schenectady, N. Y.

Coating Iron or Steel

Iron or steel may be given a permanent coating of yellow brass by using a flux of boracic acid and then dipping into a pot of melted spelter, afterwards wiping off the article while still hot. The electro-plating process, however, is the best for this purpose. A coating of copper should then first be deposited on the steel, the same as if it were to be nickel-plated, and then followed with an electro-plating of yellow brass.

Cleveland, Ohio. L. MILLER.

Copper Solution that will Color on Oily Steel

To make a copper solution that will color on oily steel, take ½ ounce sulphate copper (blue vitriol), 4 ounces water, 1 tablespoonful oil of vitriol (commercial sulphuric acid) and dissolve the sulphate of copper in the water, then slowly add the oil of vitriol a few drops at a time, shaking well at each addition. Keep the mixture away from the face when adding the oil of vitriol; if the oil of vitriol is all poured in the bottle at once the stuff will boil and shatter the bottle, as I learned by experience. F. W. B.

To Prepare Iron or Brass for Laying Out Work

To coat the finished surface of iron and steel with a copper film to facilitate laying out work, make a solution of sulphate of copper and apply to the work with a piece of clean waste; the copper film shows up the lines very plainly. This solution can also be used on brass by simply sprinkling iron filings on the brass surface, and then applying the copper sulphate solution. The surface to be coated should in all cases be free from oil, grease, etc.

Dayton, O. OLIVER E. VORIS.

To Coat Iron with Copper

Polish the iron by rubbing it well with cream of tartar, and afterward with charcoal powder, and place the metal in hydrochloric acid diluted with three times its volume of water, in which a few drops of a solution of sulphate of copper is poured. After a few minutes withdraw the iron and rub with a piece of cloth, then replace it in the solution to which add another portion of sulphate of copper. By following this plan the layer of copper may be increased at pleasure. Finally, immerse the iron in a solution of soda, wipe clean and polish with chalk. The coating thus obtained will be as firm and durable as that deposited by the electrotype process.

Pittsburg, Pa. U. PETERS.

Copper Coating Solution

A copper coating solution for use when laying out work on iron or steel which I have found more satisfactory than the ordinary blue vitriol is a mixture of saturated solution of zinc chloride with a very little copper sulphate added, say a half-dozen drops of copper sulphate to a spoonful of zinc chloride solution. When a piece of steel is rubbed with waste moistened in this solution it produces a bright copper surface that does not easily rub off.

Cleveland, Ohio. MILTON BURGESS.

Copper Plating Cast Iron

In the process of covering cast iron with a coating of copper the pieces of cast iron are first placed in a bath made of 50 parts of hydrochloric acid, specific gravity 1.1, and one part of nitric acid; they are next immersed in a second bath comprised of 10 parts nitric acid and 10 parts chloride of copper dissolved in 80 parts of hydrochloric acid, specific gravity 1.1. The pieces are then rubbed with a woolen cloth and immersed again until the desired thickness of copper is deposited. To give a bronze appearance the copper surface is rubbed with a mixture of 4 parts sal-ammoniac and one part each of oxalic acid and acetic acid dissolved in 30 parts of water. A. L. MONRAD.

New Haven, Conn.

MISCELLANEOUS FINISHING AND COATING PROCESSES FOR IRON AND STEEL

Tinning Cast Iron

To tin cast-iron articles, dissolve chloride of tin in water until the solution is fully saturated; this saturated solution is to be thinned down when needed for use, by ten times its volume of water. The articles which are to be tinned are to be wrapped around lightly with zinc sheet or wire and left in the solution ten to fifteen minutes. On removing the articles they are to be dried in sawdust, after washing well with clean water and brushing them with a wire brush, and then polished with prepared chalk. ROBERT GRIMSHAW.

Hannover, Germany.

Coloring Steel

Having occasion to darken polished spots on case-hardened parts in order to make the entire pieces appear uniform, I immersed them for about 20 seconds in a solution made as follows: Eight cubic centimeters of nitric acid and 40 cubic centimeters of water, same being measured by a druggist. The pieces I refer to were case-hardened in the usual manner (packed in bone dust). After immersing as above stated, rinse off in clear running water and you will not be able to distinguish the difference between the part which was formerly bright and the dark portion. HARRY ASH.

Chicago, Ill.

Wash for Whitening Metal Work for Laying Out

Mix whiting and white lead with boiled linseed oil to a thick paste; add some japan dryer, and thin with benzine or gasoline. This makes a fine preparation for whitening sheet iron and other work previous to laying out, as any lines drawn on the surface show up very distinctly. It also makes a very good stenciling or marking paint. A. D. KNAUEL.

Moline, Ill.

Whiting Surfaces for Laying Out Work

For laying out work on structural iron or castings a better way than chalking the surface is to mix whiting with benzine or gasoline to the consistency of paint, and then paint it with a brush; in a few minutes the benzine or gasoline will evaporate, leaving a white surface ready to scribe lines on. ALBERT D. KNAUEL.

Moline, Ill.

To Imitate Case-hardening

Occasionally it becomes necessary to darken polished or ground parts to imitate case-hardening; in order to accomplish this result use this mixture: 1 part nitric acid and 20 parts water. Immerse the article to be treated about 20 seconds, then rinse with clear water. A splendid result can be accomplished by following the above instructions. HARRY ASH.

Chicago, Ill.

Cold Tinning Process for Use on Finished Work in Iron, Brass or Steel

To tin by cold process finished work in iron, brass, or steel such as pins, tacks, wire goods, etc., put twenty pounds of stock well cleaned in sawdust, in a deep pan (14 x 20 x 3 inches is a good size) having a false bottom of zinc. Heat to the boiling point a mixture of ¼ ounce of sulphuric acid and 2 ounces of tin crystals (stannous chloride) and pour over the work. Let it stand ten minutes and then stir well, using a rake, and then let it remain ten minutes longer. Repeat the process and if two coats are not enough, give it a third coat. The zinc bottom must be washed twice a day, as rusty or oily work will not tin satisfactorily.

To polish the work, put in a wooden tumbling barrel and pour in a water pail full of strong soap and water. Let it tumble fifteen or twenty minutes, according to the nature of the work, and then tumble for a few minutes in hot sawdust to dry it. J. L. LUCAS.

Bridgeport, Conn.

To Produce a Mat Surface on Steel

To make a non-reflecting or mat surface on small steel articles such as screws, small steel stampings, etc., which at the same time shall be perfectly rust-proof, proceed as follows: Mix 2 ounces of powdered tartar with 20 ounces of water. Put the articles to be treated into this mixture in an earthen pot, and boil until they become yellow. Then place the articles in a tray with a solution of sulphate of copper (blue vitriol); take out when copperized and put in a tray with sulphur-ammoniac. When black, take out and rinse off with water. After the rinsing has been done carefully, mix a quantity of clean, very dry, beechwood sawdust with sufficient sweet oil, to render it slightly oily. Then thoroughly mix and rub in some powdered graphite, but only enough graphite should be added to give the whole a blackish appearance. Throw into the sawdust the steel parts to be blackened, but not more at a time than about one-third of the quantity of the mixture. Put the whole in a small coffee roaster such as is used in private houses, and after shaking well, roast the contents over a gentle flame, in constant motion, until the sawdust is burned to charcoal. The parts are then ready to be taken out and cooled. The roaster should be tightly closed during the roasting operation.

It is not necessary to lacquer the parts as the color put on in this manner will not wear off by ordinary handling. The parts will have a nice mat surface suitable for articles used in photographic manufacture and art goods. The formula used was a secret for many years and was successfully used by the inventor. MAX J. OCHES.

Cleveland, Ohio.

TREATING BRASS CASTINGS

Malleable Brass

Brass which possesses malleability in a high degree can be obtained by alloying 57 parts of copper with 43 of zinc.

Pittsburg, Pa. U. PETERS.

To Pickle Brass Castings

An excellent mixture to use for cleaning and brightening brass castings is as follows: Two parts, by measure, of nitric acid, and three parts of sulphuric acid. To each quart of the acid mixture made up, add one pint of common salt and stir until dissolved. The solution may be held in any suitable receptacle, say, of glazed earthenware. It is only necessary to provide a vessel large enough for the immersion of the largest piece to be dipped. The pieces are simply dipped and removed at once, and then rinsed in clear water. This solution is intended only for cleaning and brightening the castings, and not for imparting any color. T. E. O'DONNELL.

Urbana, Ill.

Flux for Brass

One ounce common soap, ½ ounce quicklime, ¼ ounce saltpeter. Mix into a ball and place in a crucible when lifted out of the furnace. This is sufficient for about 50 pounds of metal. W. R. BOWERS.

Birmingham, Eng.

To Clean Brass Castings

Brass work that has become dirty or corroded in service may be cleaned in the following wash: 1/3 part nitric acid, 2/3 part sulphuric acid, and ½ pound common salt to each 10 gallons of solution. Dip the castings in the solution for half a minute and then rinse in boiling water and dry in pine sawdust. E. W. BOWEN.

Denver, Col.

Dusting for Molds for Brass Work

To produce light castings of brass and gun-metal with a clean face and fine skin, first dust the mold with pea meal and on top of same add a slight dust of plumbago; for heavy castings dust only with plumbago. W. R. BOWERS.

Birmingham, Eng.

Cleaning Solution for Brass

To make a cleaning solution for brass work mix 1½ ounce nitric acid, 1 dram saltpeter, 2 ounces rain water. Let the mixture stand a few hours and then the articles to be cleaned may be dipped in quickly and then rinsed off and dried.

R. M. K.

PRODUCING COATED SURFACES ON BRASS, BRONZE, COPPER, ZINC AND TIN

Blacking Brass

For blacking brass I find nothing superior to chloride of antimony. The articles should be thoroughly cleaned and polished, then immersed in the solution for a short time, and dried over a spirit lamp; then brush with a black lead brush.

Angelica, N. Y. F. H. JACKSON.

For Bluing Small Brass Articles by Immersion

To blue small brass articles by immersion, use chloride of antimony, 1 ounce; water, 20 ounces; hydrochloric acid, 3 ounces. Place the solution in an earthen jar and suspend the piece in this bath until blue, then wash and dry in sawdust. The pieces should be warmed first.

To blue steel without heat, apply nitric acid; wipe off the acid clean, oil and burnish. L. E. MUNCY.

Syracuse, N. Y.

To Blacken Brasswork for Instruments

To give a dull black surface to brasswork, paint it with a mixture made of a thimbleful of lampblack, to which is added 4 or 5 spots of gold size. Mix well with a knife on a flat slate until the whole is about as thick as putty. Only put sufficient gold size to make the lampblack stick together, as too much will make a bright instead of a dull black. Add about twice the volume of turpentine to the mixture, stir well with a camel's hair brush, and apply to the brasswork. JOS. M. STABEL.

Rochester, N. Y.

To Copper Brass for Laying Out Work

To apply a copper coloring upon brass for laying out work, put a few drops of the ordinary coppering solution upon the brass and then dip a piece of iron or steel into the solution and touch the brass.

Providence, R. I. OSCAR J. BEALE.

Frosting Brass Work

Boil the brass in caustic potash, rinse in clean water, and dip in nitric acid till all oxide is removed; then wash quickly, dry in warm boxwood sawdust, and lacquer while warm. This will give brass an ornamental finish. F. H. JACKSON.

Angelica, N. Y.

Tinning Wash for Brass Work

To prepare a tinning wash for brass work, use 6 pounds of white argil (potter's clay), 4 gallons of soft water, and 8 pounds tin shavings. Boil the brass work in this solution for 15 or 20 minutes.

Birmingham, Eng. W. R. BOWERS.

Black Bronze for Brass

Dip the article, cleaned bright, in aquafortis (nitric acid); rinse the acid off with clean water, and place it in the following mixture until it turns black: Hydrochloric acid, 12 pounds; sulphate of iron, 1 pound, and pure white arsenic, 1 pound. It is then taken out, rinsed in clean water, dried in sawdust, polished with black lead and lacquered with green lacquer.

Rochester, N. Y. JOS. M. STABEL.

Silver White Bronze

To prepare silver white bronzing powder, melt together one ounce each of bismuth and tin, adding one ounce of mercury. When cool, pulverize into a fine powder.

Hoboken, N. J. R. P. PERRY.

Mat Dip for Brass

To make a mat dip for brass, mix 1 part sulphuric acid in 1 to 2 parts of nitric acid and 1 part sulphate of zinc. Let the mixture stand 24 hours, and use hot. More or less nitric acid gives a fine or coarse effect, as may be preferred.

Bridgeport, Conn. J. L. LUCAS.

To Produce a Gray Color on Brass

First clean off with alcohol, polish the surface to an even finish, making sure that grease or finger marks are removed. Then immerse in a solution of one ounce of arsenic chloride to one pint of water until the desired color is obtained. Wash in clean, warm water, dry in boxwood sawdust, warm, lacquer with a thin pale solution of bleached shellac in methyl alcohol, using a broad camel's hair brush.

DONALD A. HAMPSON.

Middletown, N. Y.

Solution for Bluing Brass

A suitable solution for bluing brass is prepared by dissolving 1 ounce of antimony chloride in 20 ounces of water and adding 3 ounces of pure hydrochloric acid. Any amount of solution may be made up, provided the different ingredients are in the above proportion. To apply, place the warmed brass article into the solution until it has turned blue. Then remove it and wash with clean water, after which dry in sawdust. T. E. O'DONNELL.

Urbana, Ill.

To Coat Brass or Copper with Tin

To tin brass or copper melt 5 pounds of tin and pour same into a tank containing one ounce of cream of tartar in about 8 gallons of water. This must be done a drop at a time to subdivide the tin so as to give a larger surface for the cream of tartar to act upon, and have the bottom of tank covered with tin. Then put a fire under the tank and place parts to be tinned in the tank and let them boil for about one hour, or until they are coated sufficiently. H. C.

To Copper Brass for Laying Out Work

To apply a copper coating on brass for laying out purposes, apply the ordinary copper solution in the same manner as used on iron or steel. Then, while the brass is still wet with this solution, cover the entire surface with a thin layer of fine cast iron dust from the drill press. Brush off the cast iron dust, and the surface will have a nice copper coating. C. S.

Bright Dip for Brass, Copper and Bronze

A bright dip for brass, copper and bronze may be produced as follows: Make a solution of 100 parts by weight of nitric acid, 50 parts sulphuric acid, 1 part soot, and 1 part salt. The salt and soot make the dip work smoothly. The article should be dipped in this solution, well washed, and dried in sawdust to prevent streaking.

Bridgeport, Conn. S. H. SWEET.

To Coat Zinc Sheet Black for Templet Work

A receipt which I have found very successful for coating zinc or tin sheets black for templet work, is the following, taken from Brown & Sharpe's book on gearing, page 85:

"Dissolve 1 ounce of sulphate of copper (blue vitriol) in about 4 ounces of water, and add about one-half teaspoonful of nitric acid. Apply a thin coating with a piece of waste." ALEX. C. LABAR.

Chattanooga, Tenn.

Silver Solution for Electro-plating

Put together, into a glass, 1 ounce silver, made thin, and cut into strips, 2 ounces best nitric acid, and ½ ounce clean rainwater. If the solution does not begin to act at once, add a little more water, and continue to add a very little at a time until it does. In the event that it starts off well, but stops, before the silver is dissolved, it generally may be started up again by adding a little more water. When the solution is entirely effected, add one quart of warm rain water and a large tablespoonful of table salt. Shake well and let settle; then proceed to pour off and wash through other waters. When no longer acid to the taste, put in 1⅛ ounce cyanuret potassa and a quart pure rain water. After standing about twenty-four hours it will be ready for use.

St. Louis, Mo. SAMUEL STROBEL.

To Blacken Zinc for Laying Out

The following receipt is often used for coating iron or steel, but it is not generally known among many of the craft that it may be used to prepare zinc for sketching, giving the zinc a dark coating. Dissolve 1 ounce sulphate of copper in 4 ounces water, add ½ teaspoonful of nitric acid and apply a thin coating to the zinc with a piece of waste. If used for iron or steel the work should then be rubbed dry. Care should be taken in handling and using the mixture, as it rusts iron and steel badly if left on.

R. M.

Recoloring Bronze

Bronze may be renovated and recolored by mixing one part muriatic acid and two parts water, and applying the diluted acid to the bronze articles with a cloth. Before applying the acid the articles should be cleaned thoroughly from all grease. After having applied the acid let the article dry, and then polish with sweet oil.

E. W. NORTON.

Acid Dip for Bronze Castings

A very suitable and effective acid dip for bronze castings may be made up in the following manner. The constituents required are: One gallon pale aqua fortis, 1 gallon oil vitriol, 4 quarts of water, and 8 ounces of rock salt. In mixing the acids add the vitriol to the aqua fortis, after which the water should be introduced, by pouring it very slowly into the acid solution. Water should never be poured into the acids separately. When the water and acids have become thoroughly mixed, the salt may then be added. The solution becomes quite warm after mixing, which is a good time to add the salt, as the heated solution dissolves the salt readily. After mixing, the solution should stand from 10 to 12 hours before using. It is best to make a large quantity of the solution if much dipping is to be done. To secure the best results it is necessary that the solution be kept at as low a temperature as possible, hence it is advisable to place the receptacle in a tank of cold water, or what is better, place it in running water.

Urbana, Ill. T. E. O'DONNELL.

To Blacken Tin for Laying Out

Very often in the shop and also in the drawing room we want to lay out some piece of work for trial on something which will show fine accurate marks, but cannot obtain a piece of sheet zinc. I have used something which is just as good and more likely to be at hand, and that is a sheet of bright tin plate rubbed over with a piece of waste dipped in a sulphate of copper solution. This is made of water and blue stone with oil of vitriol added to the proportion 1 of vitriol to 50 water. Rub the tin thoroughly, keeping the waste wet with plenty of fresh solution and soon you will see spots of brass, then of copper, then a dark gray, nearly black, which wipe dry, and you will have an ideal surface to lay out on.

The above is a kink which I have found very useful. F. W. BACH.

Ilion, N. Y.

To Blacken Brass for Templet Work and Other Purposes

The brass must be thoroughly cleaned, and then is heated slowly over a charcoal fire, care being taken not to allow the brass to touch the charcoal, or indeed not to allow any sparks from the charcoal to come in contact with the brass, as it will cause red spots. As soon as the brass is slightly red, dip it into nitric acid and reheat, just short of red. Rub strongly with a stiff bristle brush and clean with a greasy cloth. This gives a fairly permanent dead black finish. P. H. OTO.

Antique Brass Finish Shop Receipt

It is comparatively easy to get a nice antique finish on copper or copper-plated articles, but the treatment of brass is more difficult. Most of the processes used do not give a nice, clear black, but instead, a dull or grayish black coating. At one time, when visiting the shop of the Puritan Mfg. Co., Decatur, Ill., I noted the beautiful jet black of the brass articles made up with the antique finish, and upon expressing my curiosity as to how it was obtained, was offered the formula. The articles are first dipped into a strong, hot solution of potash, and then well rinsed in water; they are then immersed in a mixture of one part sulphuric and two parts nitric acid, and instantly rinsed in clear, cold water. Next they are placed in a bath consisting of two ounces acetate of lead and one ounce hyposulphite of soda to each gallon of water in the tank. This solution must be almost boiling when used. The brass is moved around in this until the desired black is obtained, then rinsed and dried. When dry and cool spot on a rag wheel. If brass doesn't turn black enough in above solution add just a little more lead. ETHAN VIALL.

Decatur, Ill.

Lacquer for Brass

I have found that the following process makes a very good lacquer for the brass parts of fine instruments, and that it requires but little labor to prepare. Make four alcoholic solutions in separate bottles of each of the following gums: Unbleached shellac, dragon's blood, annatto, and gamboge, in the proportions of about one ounce of the gum to a pint of alcohol. Keep these solutions about a week in a warm place, on a hot water or steam radiator, for instance, shaking the bottles frequently. It will be found that the alcohol will not dissolve all of the gum, but that within half an hour after shaking, a precipitate will settle on the bottom of the bottle, leaving a perfectly transparent but highly colored liquid above, which deepens in color from day to day. Decant this off, and filter through cloth, placing the liquids in tightly corked bottles. A word of caution should be given in the case of shellac. Most readers of MACHINERY are familiar with the yellow opaque shellac varnish of the pattern-maker. This is useless. But if the above proportions are used, and the solution kept warm, say 130 to 180 degrees F., a light flocculent precipitate will settle out, leaving a transparent wine-colored liquid above. It is this liquid which must be used. The four solutions should now be mixed. Equal parts of each give a rich golden yellow. After mixing, the solutions should be boiled down to about one-third of the volume, great care being used not to ignite the alcohol. Heat a piece of cast iron over a Bunsen burner, and as soon as this is hot, turn out the burner and place the solution on the iron and allow it to boil. When it ceases to boil, repeat the process. When cold this solution may be applied with a brush to the brass in the usual way, the brass having been polished with jewelers' fine emery paper, and slightly warmed. Though slightly harder to apply than the commercial lacquers, it possesses none of the disagreeable odor of the banana oil which they contain. H. C. LORD.

Columbus, Ohio.

Producing Black Nickel Coatings on Metal Surfaces

The following solution for depositing a black nickel coating on metal surfaces is given by the *Brass World*. The solution consists of the following constituents: water, 1 gallon; double nickel salts, 8 ounces; ammonium sulphocyanate 2 ounces; zinc sulphate, 1 ounce. If the zinc sulphate is not in the form of white crystals, but is white and dry, then only ½ ounce should be used. The double nickel salts are dissolved in the water, and then the ammonium sulphocyanate is added. After this has been done, the zinc sulphate is introduced. The solution is used at its ordinary temperature, but in winter should not be allowed to get colder than 60 degrees F., and works best at about 80 degrees F. Ordinary nickel anodes are employed, with a surface several times that of the work to be plated. The work is cleaned carefully, preparatory to the plating. The black nickel deposit may be put directly on steel, brass, copper, German silver, or bronze, but it is preferable to first flash the work in a hot copper solution, then in a white nickel solution, and finally deposit the black nickel. For cheap work, the copper and white nickel deposits may be dispensed with, but the black nickel is less apt to peel off if put on the white nickel. The black nickel is deposited with a weak current. Best results are obtained with a current from ½ to ¾ of a volt.

The deposition should be allowed to stand for an hour or more if a heavy deposit is desired. When the article comes from the black nickel solution, it will be found that it is of a gray or brown shade. While this disappears to a considerable extent when lacquered, the color is not a dead black. By using a dip consisting of 1 gallon of water, 12 ounces of iron perchloride, and 1 ounce of muriatic acid, a dead black color is produced. All nickel deposits should be lacquered after dipping.

The following causes of difficulties should be guarded against: If the black nickel deposit has spear-shaped markings on it and is partly white, too high a voltage has been used. If the deposit flakes off after standing for some time, too strong a current has been used, or the work has not been clean. If the deposit is too heavy, it is also apt to flake off. If the deposit is still brown or gray after it comes from the dip, the dip is old, or the article has not remained in the dip long enough. If, although the voltage is right (less than one volt), the deposit is streaked, the bath has become acid; add carbonate of nickel (plastic) to neutralize the acid. Use plenty of anode surface and old nickel anodes if possible. If the edges of the deposit are removed in the dip, the dip is too hot, or the black nickel was not deposited a sufficiently long time. If the surface is iridescent after lacquering, the lacquer is too thin.

A Gun-metal Finish

To make an imitation gun-metal finish by electrical process take ¾ pound of the double nickel salts to a gallon, and dissolve in boiling water. After the solution has cooled, add ammonia until it is slightly alkalized, then add sulphuret cyanide of potassium, about ½ ounce to a gallon. If a darker finish is required add more sulphuret. This will work excellently on all metals and they will come from the solution with a very high luster. If the work has been buffed and dipped before plating, it will require no further finishing, and should then be lacquered. It should be run with a very mild current from three to four minutes. J. L. LUCAS.

Bridgeport, Conn.

To Bronze Yellow Brass

To produce a bronze finish on rough yellow brass castings, mix equal parts of nitric acid, sulphuric acid and water; the nitric acid and water should be mixed first and the sulphuric acid added slowly. Dip the yellow brass castings into boiling water a moment, then in the acid solution, then quickly back into the boiling water, and rinse thoroughly in clean water. Dry in pine sawdust. The castings must be perfectly free from soldering solutions, etc., or stains are liable to appear. This method gives a finish similar to gas fixtures, etc., and may be rendered very permanent by coating with a transparent lacquer.

I. W. ANTANO.

To Plate Porous Work

In the plating of brass or cast iron, or other porous metals, there is more or less trouble with what is called "spotting out" which is caused by the cyanide getting into the pores, and it has been hard to find a satisfactory remedy for this trouble. The following can be used with good results: First, give the work a good stiff coat of nickel, then put it through a brass solution without buffing. After the required deposit has been obtained, rinse it in cold water, and then hang in boiling water, as long as possible without tarnishing. Then hang it in a good hot oven until thoroughly dried out, after which buff and hang for a few moments in gasoline, and put it in the oven again. You will find this will cure a great deal of the trouble experienced on that class of work. This is a valuable process and one never before printed.

Bridgeport, Conn. J. L. LUCAS.

Silver Paste for Brass

This paste is used for silvering the scales on thermometers and the dials for clocks, aneroid barometers, steam gages, etc.

Put in an ordinary tea cup or other suitable vessel, 1 ounce of silver—coin silver will do, but pure silver is better and cheaper. Fill the cup half full of nitric acid, and place it in a vessel containing water, which must be heated. As the acid heats, it throws off fumes in shape of a brown smoke, very poisonous. When the smoke ceases to appear, add a teaspoonful of common table salt, and when the fumes caused by this cease, take the cup from the heat immediately and fill slowly to the top with cold water. Allow the white powder that will now be found in the cup to settle to the bottom and then slowly decant the liquid. When almost empty, fill again with cold water, and decant again, repeating this process at least half a dozen times. Mix the powder (commercial chloride of silver will do instead) with 10 pounds table salt, and ½ pound cream of tartar. Mix thoroughly dry, then add enough cold water to make a paste. Add the water slowly so as not to get in too much. Keep in a covered vessel and from the light.

The graduation marks, figures, and letters, stamped or cut into the work may be filled with ordinary roofing tar, which is applied by heating the work enough to melt the tar. Most of the surplus tar may be scraped off with the edge of a card, or any cardboard handy. This filling stands better than sealing wax, and will not dissolve and blur when lacquered if the lacquer is put on properly. Another filling is japan, which is applied with a brush cold, and cleaned with a card as before. It is then baked, and when the work is finished, the filling will be found to be glossy and permanent and will not be dissolved by any lacquer or heat.

The piece to be silvered should be thoroughly cleaned with emery cloth or paper just before applying the paste, which is to be put on by hand and rubbed well in the surface of the work. After this is done, the work should have a dirty, silvery yellow tinge, which will be brightened by rubbing with a dry mixture of ½ pound cream of tartar and 10 pounds salt well mixed. The work should be thoroughly washed to clear it of the surplus salt and then dried in sawdust and lacquered. I have used this method for silvering over 30,000 steam gage and clock dials, and many other dials and scales; hence I know it is all right.

Brooklyn, N. Y. J. S. GORDON.

To Blacken Brass

Should it be desired to change the color of an article made of brass to a dark bronze or black, the following compound will be found to give good results, especially if the metal has a polished surface. First make up a solution of 120 grains of nitrate of silver and 5 ounces of water; then dissolve 120 grains of copper nitrate in 5 ounces of water. Mix the two solutions together in equal parts, making a quantity sufficient to immerse the articles. Clean the brass articles to be blackened thoroughly in hot soda water, and then dip in the above compound. Remove and heat in an oven until the proper shade of color appears. T. E. O'DONNELL.

Urbana, Ill.

For Coloring Brass Blue Black

To color brass blue black make a solution of ammonia and copper carbonate in the approximate proportion of 10 parts of ammonia and one part of copper carbonate by weight. Shake the mixture well until the copper carbonate is dissolved, adding the copper carbonate to the ammonia little by little until the ammonia will not dissolve any more; then add a volume of clear water equal to about one-fourth of the mixture. The brass to be colored should be polished bright, either with fine dry emery cloth, taking care not to touch the polished surface with the fingers, or made clean and bright by dipping in a strong solution of caustic soda. Before dipping agitate the compound thoroughly and then immerse the pieces of brass, keeping them in motion two or three minutes, rinse off in clean water, and dry in sawdust or clean cotton waste. When not in use the solution should be kept in a tightly-corked bottle. I have used it on instrument work very successfully. H. M. WEBER.

Cambridge, Mass.

RUST REMOVERS AND PREVENTATIVES

To Prevent Exposed Iron Rusting

To prevent iron, which is exposed to moisture, from rusting, paint over with a coat of Portland liquid cement. This is very satisfactory for posts which are set in the ground. JAMES A. PRATT.

Howard, R. I.

To Prevent Screws from Getting Rusty

To prevent screws from getting rusty and sticking tight, instead of using ordinary oil only, add some graphite. After years you will be able to unscrew them with ease, and find them as bright as new, even if they were exposed to very damp air. J. M. MENEGUS.

Los Angeles, Cal.

Rust-preventing Mixture

Melt 4 ounces of rosin in 1 quart of linseed oil and mix with 2 gallons of kerosene oil. The mixture is readily applied with a cloth or brush, and can be easily removed. M. E. CANEK.

To Clean Rusty Pieces of Steel

Put the pieces in a solution of chlorate of tin, not too strong, or it will attack the metal, and let them stay there about 24 hours or less. Take the pieces from the bath, wash them in water, then in ammonia, and then dry them quickly. They will have an appearance almost of silver, but will take the natural color by rubbing them. J. M. MENEGUS.

Los Angeles, Cal.

To Keep Machinery from Rusting

A formula for an anti-rust compound is made as follows: Dissolve 1 ounce of camphor in 1 pound of melted lard; take off the scum, and mix in as much fine black lead as will give it color. Clean the machinery, and smear it with the mixture, and after 24 hours rub clean with soft linen cloth. The machinery will keep clean, under ordinary circumstances, for a long time. JAMES A. PRATT.

Howard, R. I.

To Remove Rust from Small Steel Parts

Rust may be removed from small steel parts such as screws, nuts, pins, etc., when they are not badly pitted, by dipping them into a dilute solution of sulphuric acid. To prepare the acid bath, pour the acid little by little into a bowl partly filled with water. After each addition of acid, try one of the rusted parts, and continue trying until the proper strength is obtained to eat the rust off clean. Better results will be obtained in this manner than by working to a set formula. Let the parts remain in the acid bath until cleaned of rust, then remove and wash in soda water, and then in benzine. Finally dry the parts and brighten in sawdust. S. W. GREEN.

Preservative Oil

To make a preservative oil use high test grain alcohol and best grade of sperm oil, equal parts. Keep in a tightly-corked bottle, and shake well before using as the alcohol and oil separate after standing. Any moisture on a tool or gun at the time of application is quickly absorbed by the alcohol which in a short time evaporates, leaving a good coat of sperm oil to protect the surface from rust. E. W. NORTON.

Removing Rust from Steel

A good method for removing rust from steel is to first rub the object with sweet oil, and then after a day or two, rub it with finely powdered unslaked lime until the rust disappears. Then give it again a coating of oil with a woolen cloth, and put it in a dry place. E. W. NORTON.

Rust Preventative

To make a mixture that will prevent hardware and machinists' tools from rusting, take one-half pint of Demar white varnish, and mix it well with one gallon of turpentine, use as a wash. When the polished surfaces are thoroughly covered with a thin coat of the varnish it will show scarcely any, but will preserve the polish for years, if it is not scraped off with something very hard. H. E. WOOD.

Pearl River, N. Y.

Rust Preventative for Tools

The following I have used for a number of years, and found it O. K. in every respect. Take a pound of vaseline and melt with it 2 ounces of blue ointment—what druggists call one-third—and add, to give it a pleasant odor, a few drops of oil of wintergreen, cinnamon, or sassafras. When thoroughly mixed pour into a tin can—an old baking powder can will do. Keep a rag saturated with the preventative to wipe tools that are liable to rust.

Angelica, N. Y. F. H. JACKSON.

To Remove Rust from Polished Steel

It quite frequently happens that parts of machinery having polished surfaces become rusty. This rust is difficult to remove without scratching the highly polished surface. A very effective mixture for removing rust from such surfaces without injury may be made as follows: Ten parts of tin putty, 8 parts of prepared buckshorn, and 250 parts of spirits of wine. These ingredients are mixed to a soft paste, and rubbed in on the surface until the rust disappears. When no trace of rust seems to remain, the surface is polished with a dry, soft cloth. T. E. O'DONNELL.

Urbana, Ill.

To Clean Rusted Steel—To Preserve Steel from Rust

Rusted steel can be cleaned by brushing with a paste compound of ½ ounce of cyanide potassium, ½ ounce castile soap, 1 ounce whiting, and water sufficient to form a paste. The steel should be washed with a solution of ½ ounce cyanide potassium in 2 ounces water.

To preserve steel from rust dissolve 1 part caoutchoue and 16 parts turpentine with a gentle heat, then add 8 parts boiled oil, and mix by bringing them to the heat of boiling water. Apply to the steel with a brush, the same as varnish. It can be removed again with a cloth soaked in turpentine. A. L. MONRAD.

New Haven, Conn.

SOLDERS AND SOLDERING ACIDS

Cheap Flowing Solder

A cheap soft solder which is good for purposes where not much pressure is carried, is made by adding to each pound of lead, while melting, one teaspoonful of common salt. C. L. SCOVILLE.

Ashtabula, Ohio.

Soldering Kink

When soldering, and no acid is handy, a common tallow candle will answer the purpose. JOHN B. SPERRY.

Aurora, Ill.

Aluminum Solder

The following is a receipt for aluminum solder which we are using with success in the Elwell-Parker Electric Co.'s shop, Cleveland, Ohio. It is the result of experiments made by several of our foremen: Pig tin, 12 ounces; sheet zinc, 3 ounces; mercury, 1 ounce. Melt the zinc first and then add the tin. When the tin is melted remove from the fire and add the mercury while still in the molten state. Be careful to stir the mixture thoroughly before pouring into the mold. Use stearic acid for a flux.

Cleveland, Ohio. L. MILLER.

Soldering Galvanized Iron

For soldering galvanized iron without scraping use raw muriatic acid.

Philadelphia, Pa. WM. DAVIS.

Soldering Solution for Steel that will not Rust the Work

A soldering solution for steel that will not rust or blacken the work is made of 6 ounces alcohol, 2 ounces glycerine and 1 ounce oxide of zinc. A. L. MONRAD.

New Haven, Conn.

Non-rusting Soldering Solution

A good anti-rust solution for soldering metals where acids must not be used, is made by dissolving rosin in acetone, making a solution about as thick as molasses; it is applied in the usual manner.

Birmingham, Eng. W. R. BOWERS.

Non-rusting Soldering Fluid

To prepare a soldering acid that will not rust iron, add to a saturated solution of zinc and hydrochloric acid ¼ part ammonia, and dilute the whole with an equal quantity of water. This has been very successfully used on knitting machines in soldering needles to their holders where an acid with the above characteristics is essential. J. H. V.

Non-rusting Soldering Fluid

To make a non-rusting soldering fluid, dissolve small pieces of zinc in hydrochloric acid till effervescence ceases. After standing a day, take out the undissolved zinc, and filter the solution. Then mix with one-third its volume of C. P. ammonia 26 degrees, Beaume, and dilute with water to suit the work to be soldered. This flux does first-class service and does not rust the work. F. E. WHITTLESEY.

Corry, Pa.

Soldering Aluminum and Copper

It is often stated that aluminum cannot be readily and successfully soldered to other metals. I have, on numerous occasions, successfully and easily soldered aluminum to both copper and brass by the following method: First tin the aluminum and the copper, or brass, using stearine as a flux; wipe off clean, then use zinc chloride as flux; wipe solder composed of: tin 67 per cent., lead 33 per cent. T. ILES.

Manchester, England.

Soldering Alloys

I have used the following soldering alloys and can recommend them:

For copper with copper: Copper, 55; zinc, 40; tin, 5.

For copper with iron: Copper, 80; zinc, 16; tin, 4.

For brass: Copper, 45; zinc, 50; tin, 5.

For lead: Lead, 67; tin, 33.

Los Angeles, Cal. J. M. MENEGUS.

Soldering Paste for Copper Wires

Soldering paste has come into extensive use in electrical work as a flux for soldering, and the following receipt will be found useful in soldering copper wires when the use of an acid would be objectionable. This paste will not spatter or corrode, and the proportions are as follows: Saturate solution chloride of zinc, 1 dram; vaseline, 1½ ounce. WILLIAM DAVIS.

Philadelphia, Pa.

Solder for Small Parts

To make a solder for small metal articles cut tinfoil into the shape wanted and wet on both sides with sal-ammoniac. Have the surface of the piece clean, place on it the wet tinfoil and then press the parts together firmly and heat until the tinfoil is melted. E. W. NORTON.

Aluminum Solder

To make a solder for soldering aluminum, melt together 1 pound block tin, 4 ounces spelter, 2 ounces pure lead and 3 pounds phosphor tin. When using, clean the work with benzine and apply with a heated copper bit in the usual manner.

Lynn, Mass. L. C. CARR.

Electricians' Method of Soldering

A method of soldering that I noticed electricians using in soldering wire is as follows: The solder is melted in a pot and then poured over the joints to be soldered, by means of a small dip ladle. Then acid, paste or stick flux is applied, and the solder again applied. This makes a good joint. The solder which drops from the joint is caught by a second ladle, or in the solder pot. In some cases, when possible, the piece is dipped in the pot, the flux applied and the work again dipped. It is important in both cases to give the piece a sharp tap after the second application, to knock off any surplus solder. HERMAN JONSON.

New York City.

Solder for Gold

To make a solder for gold melt together in a charcoal fire 24 grains gold, 9 grains pure silver, 6 grains copper, 3 grains good brass; this makes a solder for gold ranging from 12 to 16 carats fine. For finer gold increase the proportions of gold in the composition. To make it darker in color lessen the proportion of silver and increase that of copper. JOSEPH M. STABEL.

Rochester, N. Y.

Solder Preparation for Aluminum

The most successful solder preparation for soldering aluminum yet secured is made up in the following manner: Melt together 64 parts, by weight, of tin, 30 parts of zinc, 1 part of lead, and a small amount of rosin. All parts, of course, must be mixed together very thoroughly while in molten condition. When thoroughly mixed the alloy should be run out in bars of desired sizes. Clean the surfaces thoroughly and apply the solder. No chemical is required, the rosin used being sufficient to cause adhesion, although it is advisable to heat the parts to be soldered gently to assist in making a good adhesion.

Olney, Ill. T. E. O'DONNELL.

Soldering Without Heat

Take 1 ounce of ammoniac and 1 ounce of common salt, an equal quantity of calcined tartar, and 3 ounces of antimony. Pound this well together and sift. Put this in a piece of linen, and enclose it well around with fullers' earth about an inch thick. let it dry, then put it in one crucible, covered by another crucible over a slow fire to get hot by slow degrees. Keep up the fire until the content of the crucible gets red-hot and melts. Then let it cool gradually, and when cold pound the mixture. When you wish to solder anything put the two pieces you want to join together on a table close to one another. Make a crust of fullers' earth, so that, passing under the joint and holding to each piece it shall be open at the top. Then throw some of the powder between and over the joint. Dissolve some borax in some hot wine, and with a feather dip in the solution and rub the powder at the place of the joint. It will immediately boil up. As soon as the boiling stops the consolidation is made. The calcined tartar is made by placing crude tartar in a covered crucible and raising it to a low red heat. Allow it to cool gradually. JOSEPH M. STABEL.

Rochester, N. Y.

Cold Solder

For flux use 1 part metallic sodium to 50 or 60 parts of mercury. These combine if well shaken in a bottle. For solder use a weak solution of copper sulphate, about 1 ounce sulphate to 1 quart of water; precipitate the copper by rods of zinc, wash the precipitate two or three times with hot water, drain off the water and add 6 or 7 ounces of mercury for every 3 ounces of precipitate. A trifle of sulphuric acid will assist in the combining of the matter. The combination will form a paste which sets very hard in a few hours. A. L. MONRAD.

New Haven, Conn.

Soldering Acid and Solders

I have seen a number of different formulas for soldering acids and have had occasion to try several of them with more or less satisfaction. Among all the different ones which I have tried, I know of but one, however, that actually can be said to fill all requirements.

The acid is composed of: Solution chloride zinc, 1 ounce: glycerine, 1 ounce. alcohol, 7 ounces.

As far as the solder itself is concerned, one can, of course, make compositions of tin and lead in almost any proportions to fill the requirements in general. The melting point of these different compositions will vary greatly, however, according to the proportions of above metals in same, and, of course, this is an important factor in many instances, especially when wanting to solder metals which have a low melting temperature, in which case the solder ought to be a composition which itself will melt at a very low temperature. If bismuth is added to the composition the melting temperature will almost invariably be lowered. I have on hand a fairly complete table of compositions for solder, giving their respective melting temperatures and the metals for which they are best adapted:

Tin.	Lead.	Bismuth.	Melting temp. Deg. Fahr.
15.5	32.0	52.5	205
20.0	26.0	54.0	214
20.6	26.8	52.6	217
21.4	27.8	50.8	225
24.8	22.1	53.1	237
20.0	20.0	60.0	250
15.0	25.0	60.0	257
63.2	36.8		361
60.0	40.0		372
70.0	30.0		381
50.0	50.0		415
34.0	66.0		446
30.0	70.0		495

A

Improved Soldering Acid

A very satisfactory soldering acid may be made by the use of the ordinary soldering acid for the base and introducing a certain proportion of chloride of tin and sal-ammoniac. This gives an acid which is far superior to the old form. To make one gallon of this soldering fluid, take three quarts of common muriatic acid and dissolve as much zinc as possible in it. This, as is well known, is the common form of acid used in soldering. Next dissolve 6 ounces of sal-ammoniac in a pint of warm water. In another pint dissolve 4 ounces of chloride of tin. The three solutions should then be mixed together. After mixing, the solution may appear cloudy, and can be cleared up by a few drops of muriatic acid, care being taken not to add too much. The acid is used in the same manner as any ordinary soldering fluid. It will be found that it will not spatter when the hot iron is applied, and also that a cheaper grade of solder may be used with it, if necessary.

Urbana, Ill. T. E. O'DONNELL.

To Solder Aluminum

The great disadvantage of aluminum to the sheet metal worker is the difficulty encountered in soldering. This is caused by the formation of an oxide on the surface of the heated metal, the oxide preventing the solder from alloying with the aluminum. This difficulty can be surmounted by employing the following method:

Make a solder of 80 per cent tin and 20 per cent zinc, and use stearic acid as a flux. Tin the surface with the above, moving the copper bit backward and forward over the metal and flowing the solder. The film of oxide can then be cleaned off, and the coated surface can be easily soldered with the above-named solder or ordinary tinsmiths' solder. A. EYLES.

Manchester, Eng.

Gold Solders

Gold solder suitable for 18-karat work: Gold, fine, 1 ounce; silver, fine, 144 grains; copper wire, 96 grains. (Troy weight.)

Suitable for 16-karat work: Fine gold, 1 ounce; fine silver, 144 grains; copper wire, 168 grains.

Suitable for 15-karat work: Fine gold, 1 ounce; fine silver, 240 grains; copper wire, 240 grains.

Suitable for 14-karat work: Fine gold, 1 ounce. fine silver, 300 grains; copper wire, 300 grains.

Hardest silver solder: Fine silver, 1 ounce; shot copper, 120 grains.

Best hard silver solder: Fine silver, 1 ounce; shot copper, 105 grains; spelter, 15 grains.

Medium silver solder: Fine silver, 360 grains; shot copper, 96 grains; spelter, 24 grains.

Easy silver solder: Fine silver, 336 grains; shot copper, 108 grains; spelter, 36 grains. H. D. SCHATTLE.

Syracuse, N. Y.

Soldering Paste

By the requirements of the electrical trade, in certain cases no acid soldering flux can be used. A flux that can be used on any kind of work is known as a soldering paste. For soldering copper wires and other electrical conductors the paste is unequaled, and is particularly adapted for work in which spattering and corrosion are objectionable. The mixture for soldering paste consists of certain proportions of grease and chloride of zinc. The grease commonly used is petrolatum or vaseline, which will give the paste the proper consistency. The proportions used are petrolatum or vaseline, 1 pound, and 1 fluid ounce saturated solution chloride of zinc.

Urbana, Ill. T. E. O'DONNELL.

Non-corrosive Soldering Fluid

An economical non-corrosive soldering fluid is the following: Put any quantity of chloride of zinc in a bottle, fill it up with alcohol, and allow it to stand at least 48 hours, then carefully pour off the alcohol, mix it with an equal quantity of glycerine and shake. The zinc remaining in the bottle can be used until there is nothing left of it, since the alcohol which is poured off after 48 hours contains all the chloride of zinc which is necessary for good soldering.

New York. HERMAN JONSON.

Silver Solder for Brazing

Much difficulty arises in the use of brazing solder. The best alloy to use in brazing is the common silver solder. It has the advantages of a low melting point and toughness, which are not found to such a

high degree in common brazing brasses composed of copper and zinc. The melting point of silver being lower than that of copper, and as it does not oxidize when heated, it is admirably adapted for use in brazing solder. The proper mixture for the solder consists of two parts fine silver filings and one part fine brass, which latter consists of 2 parts copper and 1 part zinc. T. E. O'DONNELL.

Urbana, Ill.

MISCELLANEOUS ALLOYS

Alloy for Caliper and Gage Rod Castings

A mixture of 30 parts zinc to 70 parts aluminum gives a light and durable alloy for gage rods and caliper legs. The gage rods must be steel tipped for the alloy is soft and wears away too rapidly for gage points. JAMES A. PRATT.

Howard, R. I.

Alloy for Pattern Letters and Figures

A good alloy for casting pattern letters and figures and similar small parts in brass, iron or plaster molds is made of lead, 80 parts, and antimony, 20 parts. A better alloy would be lead, 70 parts; antimony and bismuth, each 15 parts. To insure perfect work the molds should be quite hot by placing them over a Bunsen burner. The writer has had thousands of pattern letters and figures made in this manner. OSCAR E. PERRIGO.

Neponset, Mass.

Anti-friction Metal

An anti-friction metal of most excellent quality and one that I have used with success for a bearing on an internal grinding shaft, which was 5-16 inch diameter, 7 inches long, and 5 inches in the bearing, and run at a speed of 36,000 R. P. M. is made as follows: 17 parts zinc, 1 part copper, 1½ part antimony; prepared in the following way: Melt the copper in a small crucible, then add the antimony and lastly the zinc, care being taken not to burn the zinc. Burning can be prevented by allowing the copper and antimony to cool slightly before adding the zinc. This metal is preferably cast into the shape desired and is not used as a lining metal because it requires too great a heat to pour. It machines nicely and takes a fine polish on bearing surfaces. It has the appearance of aluminum when finished. Use a lubricating oil made from any good grade of machine oil to which 3 parts of kerosene have been added. HERRMANN G. KROEGER.

Louisville, Ky.

LUBRICANTS FOR BEARINGS, ETC.

Lubricant for Lathe Centers

An excellent lubricant for lathe centers is made by using 1 part graphite and 4 parts tallow thoroughly mixed.

Rock Falls, Ill. E. C. NOBLE.

Preparing Fine Oil for Delicate Machinery

Put small zinc and lead shavings in equal quantities into best olive oil, and place the oil in a cool place until it becomes colorless. This oil is the best obtainable for fine mechanisms. O. G.

Self-lubricating Bearings

In hard gun-metal bushes, bore a good fit to shaft and split, drill four holes per square inch of surface, each ¼ inch diameter by ¼ inch deep. The holes are to be flat at the bottom and to be spaced zigzag, so that one row of holes is between the holes in the opposite side, thus: . ' . ' . Fill the holes with a compound prepared as follows: Melt 1 pound solid paraffine and add 2 ounces of litharge, dissolved isinglass and sulphur; add further 2 pounds of fine plumbago and mix thoroughly.

Toronto, Can. J. H. HOLDSWORTH.

Lubricant for High-speed Bearings

To prevent heating and sticking of bearings on heavy machine tools due to running continuously at high speeds, fill an oil can with a good spring bottom (the "Gem" oiler preferred) about one-eighth full of Dixon's flake graphite, and the remainder with kerosene oil. As soon as the bearing shows the slightest indication of heating or sticking, this mixture should be forcibly squirted through the oil hole until it flows out between the shaft and bearing, when a small quantity of thin machine oil may be applied. H. J. BACHMANN.

New York.

Lubricating Oil for Heavy Duty and Fast Running Journals

An excellent lubricating oil for heavy duty and fast running journals may be made by mixing equal parts of sperm oil, cylinder oil and "black strap" or common machine oil. A. D. KNAUEL.
Moline, Ill.

Cooling Compound for Necks of Rolls and Shafts

Dissolve 2¼ pounds of lead acetate in 14 pounds hot tallow and add 2¼ pounds black antimony. Stir the ingredients constantly until cold. W. R. BOWERS.
Birmingham, England.

Oil for Use on Micrometer Screws

To prepare oil for micrometers, fine mechanisms, etc., take neatsfoot oil and put into it some lead shavings in order to neutralize the acid contained in the oil; let this stand for a considerable time, the longer the better. Oil thus prepared never corrodes or thickens. JOSEPH M. STABEL.
Rochester, N. Y.

Lubricant for Lathe Centers

I have tried many different kinds of lubricants for lathe centers and as yet I have found nothing equal to white lead mixed with sperm oil, with enough graphite added to give it a dark lead color. It can be mixed and kept in small tin boxes; add oil when necessary to keep it from getting too thick. S. C. S.

A Grease for Gear Wheels

A good grease for gear wheels where iron meshes into iron can be made of 1 part of graphite, and 4 parts of tallow mixed with some oil. For steel gears meshing into wood 1 part of graphite, 2 parts of beeswax and ½ to 1 part of tallow will form a very good and lasting grease for same.
Cleveland, O. MAX J. OCHES.

Lubricant for the V's of Large Planers

When very heavy work is to be done on a planer it may happen that the oil or other lubricant used on the ways of the planer does not possess sufficient "body" to resist the pressure, and the wearing surface will be cut or badly "roughed up." The writer had a case wherein the planer table weighed eleven tons and the load to be put upon it thirteen tons, making twenty-four tons in all. The bearing surfaces of the V's appeared very narrow to sucessfully support such a weight. To avoid cutting, the surfaces were lubricated with a mixture of one gallon of "Vacuum" cylinder oil and one pound of Dixon's flake graphite. The planing job was easily and successfully done with no injury to the wearing surfaces. OSCAR E. PERRIGO.
Neponset, Mass.

White Lead and Tallow of Even Consistency at All Temperatures

In order to keep white lead and tallow soft in winter and summer alike, so that it can be applied with a brush to finished parts of machinery before shipping them, and for use in fitting keys, etc., prepare a mixture composed of five pounds of white lead and fifteen pounds of tallow. Heat this in a suitable receptacle, and stir until the ingredients are thoroughly mixed. Then remove the mixture to a cool place, and add two quarts of linseed oil, continuing to stir the composition until it becomes cold, as otherwise the white lead will settle at the bottom. This mixture will always remain of the same consistency at all temperatures. R. S. F.

LUBRICANTS FOR MACHINING OR WORKING METALS

Tapping Holes in Cast Iron

Kerosene oil used as a lubricant for tapping holes in cast iron is the best lubricant known to the writer. WM. DAVIS.
Philadelphia, Pa.

To Turn Very Hard Iron and Steel

Use a drip can for the tool with the following solution: petroleum, 2 gallons; turpentine, 1 gallon, and 2 ounces of camphor. J. H. HOLDSWORTH.
Toronto, Canada.

To Turn Aluminum

To produce a smooth surface when turning aluminum use kerosene oil for a lubricant. If turning in a turret lathe provided with an oil pump, mix the kerosene oil with lard oil, 1 part of lard oil to 3 parts of kerosene, as kerosene itself is too thin to be fed through the ordinary oil pump without being mixed with a more heavy flowing fluid. Kerosene oil is also the best lubricant for use in boring, threading and reaming aluminum.
East Hartford, Conn. JOHN C. MONRAD.

To Drill Hard Steel

To drill hardened steel make an old-fashioned flat drill and temper as hard as it will stand. Use camphor and turpentine in place of oil. I have drilled steel in this manner which I could not drill in any other way. G. E. HETZLER.

Dayton, O.

A Lubricant for Cutting Threads

After trying various kinds of lubricants in cutting threads on tool steel, machine steel, etc., I found that common lard (not lard oil) mixed with about one-third turpentine gave the best results. The mixture may be applied with a small brush.

Paterson, N. J. STEPHEN COURTER.

Drilling Compound

A good drilling compound is made by adding 1 pound common soda to 4 quarts water, and 1 pint machine oil. Let stand for about one hour and it will be ready for use. This will not rust the machines and is clean to work with.

Winnetka, Ill. FRANK PAVLIK, JR.

Lubricant for Cutting Aluminum

A good lubricant for cutting aluminum in the lathe is kerosene oil. It will permit a better finish, and will materially reduce the liability of tearing the surface by the cutting tool. SREGOR.

Lubricant for Aluminum Cutting

The following mixture makes the best lubricant for turning, or any other machining operation on aluminum, that I have ever tried: Mix 1 part good lard oil with 4 parts of kerosene oil.

A. A. STEVENSON.

Lubricant for Fitting Aluminum Threads

When screwing an aluminum article onto an iron or steel part, much trouble is often experienced by the breaking and tearing of the threads of the softer metal. This can be prevented by lubricating the screw well with a mixture of oil and graphite. SREGOR.

Lubricating Mixture for Cutting Tools

The proportion of ingredients of a lubricating mixture for cutting tools is 6 gallons of water, 3½ pounds of soft soap, and ½ gallon of clean refuse oil. Heat the water and mix with the soap, preferably in a mechanical mixer; afterward add the oil. A cast iron circular tank to hold 12 gallons, fitted with a tap at the bottom and having three revolving arms fitted to a vertical shaft driven by bevels and a fast, loose pulley, answers all that is required for a mixer. This should be kept running all through the working day.

Manchester, Eng. H. T. MILLAR.

Lubricant for Turning Copper

A solution of sal-soda mixed with lard oil is a lubricant I have seen used on copper in turret lathe work with good results. S. H. SWEET.

Bridgeport, Conn.

Solution for Drilling Hard Steel

A mixture which will permit hard steel or iron to be drilled with ordinary drills is made by using 1 part spirits of camphor and 4 parts turpentine. Mix well and apply cold, letting it remain a few minutes before applying the drill. Run the drill slowly with fine feed. C. E. MINK.

Syracuse, N. Y.

Lubricant for Turning Copper

Gasoline is an excellent lubricant. In our shop we have used it as a lubricant for cutting copper with very good results.

Rockford, Ill. GEORGE C. NASH.

Lubricant for Pipe Screw Threads

The best "dope," so-called in shop parlance, that I have ever seen used for making pipe connections, is composed of 1 pint of "black strap" machine oil, ½ pint graphite, ¼ pint of white lead, and a teaspoonful of flour emery. These proportions are not exact, but they are substantially what are used. The object of the flour emery is to polish the threads as they are being screwed together. The graphite, white lead and oil make a fine lubricating mixture, which has enough consistency to stop incipient leaks. I have seen many large pipe radiators made up using this mixture, and they never leaked a drop when the steam was turned on. M. E. CANEK.

Altay, N. Y.

Lubricants for Use in Cutting Bolts and Tapping Nuts

Mineral oils should never be used in thread cutting and tapping, as they do not generally flow freely enough. An excellent solution for this purpose can be prepared by dissolving 1½ pound of sal-soda in 3 gallons of warm water, then adding 1 gallon of pure lard oil. This is known as a soda solution. Pure lard oil is the best for fine, true work. T. E. O'DONNELL.

Urbana, Ill.

Turning Copper

Those who have had to turn copper in the lathe have generally wished they had let someone else do the work, and that they could stand by and jeer when it was being performed, or else criticise it after it was done. Soap and water do not help; turpentine is a delusion and a snare; but milk does the trick "with neatness and dispatch." ROBERT GRIMSHAW.

Hanover, Germany.

Lubricating Mixture for Cutting Thread in Tool Steel

To make a good lubricating mixture for cutting thread in hard tool steel, use equal parts of turpentine and benzine or kerosene. For cutting in soft tool steel mix equal parts of kerosene and lard oil. These mixtures always flow even and keep just about enough moisture at the cutting point.

Kearney, N. J. EVERETT KNEEN.

Lubricants for Redrawing Shells

Zinc shells should be clean and free from all grit and should be immersed in boiling hot soap water. They must be redrawn while *hot* to get the best results. On some shells hot oil is sometimes used in preference to soap water.

For redrawing aluminum shells use a cheap grade of vaseline. It may not be amiss to add that the draw part of the redrawing die should not be made too long, so as to prevent "too much friction," which causes the shells to split and shrivel up.

For redrawing copper shells use good thick soap water as a lubricant. The soap used should be of a kind that will produce plenty of "slip"; if none such is to be had, mix a quantity of lard oil with the soap water on hand and boil the two together. Sprinkling graphite over the shells just before redrawing sometimes helps out on a mean job. C. F. EMERSON.

Lubricating Soap for Wire Drawing, Screw Cutting and Working Metals

Put 20 pounds of pure caustic potash into an iron or earthen vessel with 2 gallons of water. The potash will dissolve very quickly by heating the water. Heat 9½ gallons of oil to about 140 degrees F., which is most easily done by bringing a small portion of the oil to the boiling point and adding this to the remainder. Pour the caustic potash lye into the oil in a small stream, stirring steadily with a wooden paddle until the oil and lye appear well combined and smooth, which will take only a few minutes. Put the mixture in a warm place, covering the vessel well with blankets or woolen rugs to keep the heat caused by the mixture combining and turning into soap. This wrapping is very important, the object being to keep the temperature unifrom until saponification is completed. The mixing may be done in a wooden vessel, half an oil barrel answering very well. After three or four days the soap is formed and may be used, though it is better, in order to insure perfect saponification of all the oil, to stir it up well again and leave standing, still well covered, for a few days longer. In this way the finest possible soap for lubricating purposes is made. It is a real potash soap made pure for use, not made cheap for sale by the addition of water and impurities, and, moreover, cannot be excelled for cleaning or washing purposes, especially for washing flannels, and will never cause sore hands.

Use a first-class pale seal oil for soft soap for wire drawing, though a good, refined cotton-seed oil may be used for general purposes. It is absolutely necessary that the caustic potash be unadulterated, for the principle of this cold process of making soap depends on the use of strong, pure lye of caustic potash.

The best way of making the suds with this soap is as follows: Put 6 pounds of the soap into a vessel with 2 gallons of hot steam water, heat to thoroughly dissolve the soap, stirring well, then add 6 more gallons of water and lastly 3 gallons of oil, which should be thoroughly stirred into the soap and water, so that on standing over-night the oil will not separate. This will be found to give very good results.

The cost of this soap depends on the quality of the oil and whether wholesale or retail prices are paid. Even at the latter it will not exceed 7 cents per pound. With cotton-seed oil and wholesale prices it can be made for about 5 cents a pound.

Milwaukee, Wis. A. F. BIERBACH.

Lubricant for Drawing Dies

The following mixture has given very good results as a lubricant on drawing dies when drawing sheet metal: Boil together until thoroughly mixed, 1 pound of white lead, 1 quart of fish oil, 1 pint of water, and 3 ounces of black lead. Apply to the sheet metal with a brush before it enters the dies. JOS. M. STABEL.

Rochester, N. Y.

Lubricant for Drilling Copper

The best thing in my opinion to use for drilling copper, especially with small drills, is a piece of tallow. I have noticed a great number of receipts given, but I find that this simple means answers the purpose equally well or better than anything else.

Marquette, Mich. GEO. W. SMITH.

Lubricant for Small Oilstones

As a lubricant for honing out dies or other work with an oilstone, kerosene oil gives the best results as it not only enables the stone to take hold, but keeps it clean and prevents it from filling up.

C. F. EMERSON.

BELT AND ROPE DRESSINGS

Belt Dressing

I have found the following mixture to answer the purpose of a good belt dressing as well as an excellent anti-slip medium for hard-worked leather driving belts: Russian tallow, 1 ounce; best lard oil, 2 ounces; Venice turpentine, 16 ounces. This dressing is good to use on the belts of belt-driven motor cycles. W. R. BOWERS.

Birmingham, Eng.

Transmission Rope Dressing

A good transmission rope dressing is made by melting together 450 pounds of tallow, 33 pounds rosin, 150 pounds beeswax, 20 pounds pine tar, 14 pounds lampblack, and 15 pounds tobacco tin-foil. Pour the mixture in molds to make stock 2½ inches in diameter, and 11 inches long, weighing about 3 pounds each. Use one for about 400 feet of one-inch rope.

New York. HERMAN JONSON.

Wire Rope Grease

A mixture of ¾ oil and ¼ colophony (rosin), will be found to be a very good lubricant for wire ropes such as used on power transmitting and conveying machinery, if applied warm. Boiled linseed oil also answers the same purpose when high speed is required. MAX J. OCHES.

Cleveland, O.

Belt Dressing

A great many people think they know how to make a good belt dressing. This accounts for the many poor ones in the market. Here is one that will do about all the good that any of them will and none of the harm to the structure of the belt. Melt a pound of beeswax in a gallon of neatsfoot oil by a gentle heat. The most convenient way to secure a good mixture is to melt the beeswax first, then add the oil slowly, stirring it constantly until it is thoroughly mixed.

Neponset, Mass. OSCAR E. PERRIGO.

FIRE AND WATERPROOFING RECEIPTS

Fireproofing Solution for Toolmakers' Aprons, Etc.

Toolmakers' aprons, factory shades and other inflammable materials may be rendered absolutely fireproof by being treated with the following solution: To ½ pound tungstate of soda add 2 quarts of water, or enough to entirely dissolve it, and bottle up tightly. This stock solution is to be added to sufficient water required to soak the article in the proportion of one-fifth the above solution to the required water. After being soaked, hang the article up to dry. Fireproofing factory shades at windows near gas jets or the cloth aprons worn when working over a fire in hardening and tempering tools, etc., will often save bad fires or serious accidents.

E. W. NORTON.

To Waterproof Leather

To waterproof leather and leave it soft and pliable, apply a mixture of 4 parts castor oil and 1 part raw indla rubber, by weight. Heat the oil to 250 degrees F., then add the rubber, cut into small pieces. Gradually stir until the rubber is completely dissolved and then pour into a suitable vessel and let cool. If used on dark leather add sufficient printer's ink to give the dark color. E. W. NORTON.

To Waterproof Cloth Tool Bags or Cases

To waterproof tool bags or cases made of duck or other cloth, either of the following formulas may be used:

Use ½ pound of alum and 2 ounces of saltpeter dissolved in 1 quart of water. Immerse the article to be waterproofed in this mixture for 40 minutes, and boil hard; then rinse in cold hard water, hang up and let dry thoroughly before using.

Melt ½ pound of paraffine wax and mix in 1 quart of gasoline. Immerse the article in this and wring out and spread out to dry. In a short time it is ready to use.

E. W. NORTON.

To Fireproof Wood in Forge Shops

To protect the woodwork around or near a forge apply three coats of 3 parts alum and 1 part copperas, dissolved in water. Apply hot, and only allow sufficient time between applications for the preparation to saturate the wood. Follow this with a fourth coat composed of solution of copperas made to the consistency of paint by mixing with fireclay. This treatment will not only render the wood fireproof but will preserve it for many times its ordinary life.

Another fireproofing mixture for the same purpose is composed of 3 parts ground wood ashes and 1 part boiled linseed oil. This is applied with a brush.

Still another fireproofing treatment consists of three applications of a hot solution of phosphate of ammonia. The last two treatments require renewing at least once a year. E. W. NORTON.

CLAYS AND CLAY SUBSTITUTES

Mixture for Fire Cement

To make a fire cement use 100 parts fire clay, wet; 3 parts black oxide manganese; 3 parts white sand; and ½ part powdered asbestos. Thoroughly mix, adding sufficient water to make a smooth mortar.

Syracuse, N. Y. C. E. MINK.

Emergency Repairs of Boiler Furnace

When it is necessary to repair the boiler furnace and fire brick cannot be obtained, take common earth, mix with water in which has been dissolved a small amount of common salt. Use this mixture the same as fire clay. It will be found to last almost as long. R. E. VERSE.

Fire Clay Mixture

A fire clay mixture that will stand a high temperature without cracking or checking is mixed as follows: 45 per cent crushed fire brick, 50 per cent fire clay, and 5 per cent clean, sharp sand. This is to be moistened and mixed to a heavy paste, tamped into the shape required and burned dry.

Denver, Col. E. W. BOWEN.

Mortar for Stopping Holes in Boiler Settings, Etc.

I have successfully used the following simple mortar for stopping leaks in chimneys, etc.: Mix hardwood ashes, 3 quarts; chimney soot, 1 quart; common salt, 1 quart; and sufficient water to make a stiff mortar. Apply at once as it hardens quickly. It is good for stopping cracks in boiler settings and other brickwork structures where not exposed to very high temperatures. Although of an improvised and primitive nature it answers the purpose very well, and has the merit of being made of materials available almost everywhere. It is a very old receipt; in various proportions it was used by our forefathers years ago. F. EMERSON.

Newark, N. J.

Claying Mixture for Forges

Running as we do about twenty-four fires in our smith shop, we have experienced some little difficulty in securing a satisfactory claying mixture with which to clay the forges. This difficulty arises, in part, from the fact that the forges are used by inexperienced individuals. After repeated trials with various mixtures recommended, we experimented until we finally hit upon the eminently satisfactory one given in the following: 20 parts fire clay; 20 parts cast iron turnings; 1 part common salt; ½ part sal-ammoniac; all by measure.

The materials should be thoroughly mixed dry and then wet down to the consistency of common mortar, constantly stirring the mass as the wetting proceeds. A rough mold shaped to fit the tuyere opening, a trowel and a few minutes' time are all that are needed to complete the successful claying of the forge. This mixture dries hard and when glazed by the fire will outlast anything ever tried.

St. Louis, Mo. STANLEY H. MOORE.

VARNISHES

Varnish for Steel

A good varnish for steel may be made by dissolving 10 parts of clear grains of mastic, 5 parts of camphor, 15 parts of sandarac, and 5 parts of elemi in a sufficient quantity of grain alcohol. Apply the varnish without heat. JOS. M. STABEL.
Rochester, N. Y.

Varnish for Iron Work

To make a varnish for outdoor wood and ironwork, dissolve in about 2 pounds of tar oil ½ pound of asphaltum and a like quantity of pounded rosin; mix hot in an iron kettle, care being taken to prevent any contact with the flame. When cold the varnish is ready for use.
Rochester, N. Y. JOSEPH M. STABEL.

Black Varnish for Metals

A good varnish for finishing metals can be made by mixing 1,000 parts of benzine, 300 parts of pulverized asphalt, and 6 parts of pure india rubber, to which is added enough lampblack to give the desired consistency to the mixture.
Bridgeport, Conn. H. A. SHERWOOD.

Varnish for Drawings

Dissolve by gentle heat 8 ounces of sandarac in 32 ounces of alcohol. Another receipt is: Dissolve 2 pounds of mastic and 2 pounds of a lammar in 1 gallon turpentine without heat. The drawings must first be sized with a strong solution of isinglass and hot water. W. R. BOWERS.
Birmingham, Eng.

Varnish for Cast Iron Patterns

For small cast iron patterns the following is a very satisfactory method of varnishing. Apply boiled linseed oil to the iron, the pattern being heated to a temperatnre that will just char or blacken the oil; the oil appears to enter the pores of the iron, and after such an application the metal resists rust and corrosive agents very satisfactorily. JAMES A. PRATT.
Howard, R. I.

To Clarify Shellac Varnish

Even with the best of care the patternmaker will find his shellac leaving dirty streaks on the pattern from various impurities held in suspension in the varnish. These may be entirely precipitated by the gradual addition of some crystals of oxalic acid, stirring the varnish to aid their solution, and then setting it aside over night to permit the impurities to settle. No more acid should be used than is really necessary. OSCAR E. PERRIGO.
Neponset, Mass.

Black Varnish for Iron

A good black varnish for cast iron and forgings can be made of ¼ pound lampblack; ½ pound rosin; 1 pound asphaltum; 1 quart turpentine spirits; and a small quantity linseed oil. The lampblack is first rubbed up with the linseed oil, no more oil being used than necessary for this purpose. The other ingredients are then mixed with it thoroughly. O. G.

Varnishing Blue-prints or Drawings

The appearance of varnished blue-prints and drawings may be greatly improved and the amount of bleached shellac varnish considerably decreased by the following process: Soak overnight a quantity of isinglass in just enough cold water to cover it. Use a perfectly clean glue kettle, in which it is to be heated up, adding whatever amount of water may be needed to make a moderately thin sizing. Apply this warm, *not* hot, to the drawing or blueprint. When dry apply one good coat of bleached shellac varnish. The effect will be nearly as good as the best varnished maps. OSCAR E. PERRIGO.
Neponset, Mass.

Composition of Spirit Varnish

The table below gives the composition in ounces of eight different kinds of varnish:

Sandarac	2	8	—	4	2	—	1	1
Best shellac	1	—	5	2	5	10	5	4
Mastic	½	—	—	1	—	2	1	1
Benzoin	—	—	—	1	—	—	1	1
Powdered glass	1	—	—	4	5	—	—	—
Venice turpentine	1	2	1	2	2	—	—	1
Elemi	½	—	—	—	1½	—	—	—
Alcohol	6	32	32	32	24	32	32	32

Varnish can be "paled" by adding 2 drams of oxalic acid per pint of varnish; it can be colored red with dragon's blood, brown with logwood or madder, and yellow with aloes or gamboge, each dissolved in spirits and strained. W. R. BOWERS.
Birmingham, England.

To Improve the Color of Shellac Varnish

Occasionally the shellac varnish used by the pattern-maker for varnishing very nice patterns will seem to lose its clear, amber tint. It is frequently the case that the jar is cleaned out and a fresh lot dissolved. This does not always cure the trouble. Any desired depth of tint may be readily obtained by the addition of a small quantity of gamboge previously dissolved in a small quantity of alcohol. It should be kept on hand for this purpose.

Neponset, Mass. OSCAR E. PERRIGO.

PAINTS AND WHITEWASHES

Waterproof Paint for Plaster

To make waterproof paint for plaster get some mica plates, bleach them by fire, boil in hydrochloric acid, wash and dry and reduce to a fine powder; then mix with sufficient quantity of collodion to make it run from the brush. Apply with ordinary paint brush. F. L. ENGEL.

New Britain, Conn.

Paint for Fitting and Scraping

To make a paint for fitting and scraping get five or ten cents' worth of scarlet vermillon (powder) at any store where paint is sold. Melt a tablespoonful of lard and mix into the dry paint until like thick cream, and when cold it is just right. The vermilion is very fine and has no grit in it so that the least touch of the mixture shows.

This is better than the tube paint generally used, as being mixed with animal oil, it will stand exposure to the air for a year or more without drying; but the tube paint is mixed with vegetable oil and will soon harden on exposure to the air. Any colored paint powder can be used, which is preferred. To test for grit take some between the thumb and forefinger. F. W. B.

Zinc Paint for Oil Wells

Persons having occasion to paint oil wells of bearings, or any surface coming in contact with either hot or cold oil, will find a zinc paint consisting of 25 pounds oxide of zinc, 3 gallons gloss oil, and 1 quart linseed oil, cut with turpentine, and bleached with ultramarine blue, to be one of the best coverings ever made. The surface to be covered should be absolutely free of all greasy or oily substances; if proper care is taken, the paint will not crack and will retain its pure white appearance indefinitely. The paint can be blown into water jackets of bearings, filling the sand holes, and as it dries rapidly, will be found excellent for the purpose. ELECTRO.

Marking Paint

In shops making a business of repairing machinery, it is generally necessary to mark the parts of machines in some way so that they may be properly reassembled. This is especially true in railway shops, where the marking is necessary more for the purpose of distinguishing the parts of different engines. The best way to mark such parts, of course, is to stamp them with steel dies; but this is not always practicable, and, in the absence of such means of marking, it is customary to use a marking paint made of white lead mixed with turpentine to a thin consistency. Such paint dries quickly and when dry is not easily removed. It has the advantage of showing up fairly well on greasy surfaces. but it is better that the surfaces to be marked should be well cleaned with kerosene oil before marking.

Newark, N. J. F. EMERSON.

Brilliant Whitewash

Half a bushel unslaked lime; slake with warm water, cover it during the process to keep the steam; strain the liquid through a fine sieve or strainer; add a peck of salt, the same to be previously well dissolved in warm water; add three pounds of ground rice boiled to a thin paste and stir in boiling hot; add one-half pound of glue which has been previously dissolved over a slow fire and add five gallons of hot water to the mixture. stir well and let it stand for a few days, covering up to keep out dirt. It should be put on hot. One pint of the mixture, properly applied, will cover a square yard. Small brushes are best. There is nothing can compare with it for outside or inside work and it retains its brilliancy for many years. Coloring matter may be put in and made of any shade—Spanish brown, yellow ochre, or common clay, etc.

Yours truly,
U. S. GRANT.

To my dear friend, I. Bulson,
San Francisco.

P. S.: I whitewashed the White House all over with it U. S. G.

Waterproof Marking Paint for Stone

To prepare a marking paint for use on stone where exposed to the water and dampness, use pitch, 11 pounds, lampblack, 1 pound, and heat carefully, adding sufficient turpentine to give the mixture the desired consistency. M. E. CANEK.

Non-flaking Whitewash

To prepare whitewash for fences, buildings, shop interiors, etc., that will not flake and fall off, mix 1 part fine Portland cement with about 8 gallons whitewash. The cement binds the whitewash to the wood and makes a permanent covering which is unaffected by weather conditions. The small quantity of cement used and the constant stirring necessary to keep the whitewash in good condition for applying, prevents the cement hardening in lumps at the bottom of the pail, as might be expected. M. E. CANEK.

PLASTER OF PARIS

Mixing Plaster of Paris

Almost every one has to mix up gypsum or plaster of paris once in a while, but few know how to do it so as to make a smooth cream, or thin dough, without lumps. The trick is not to pour the water on the plaster, but to turn the latter gradually into the water, spreading it about in shaking it in, and to avoid stirring until all the plaster has been added. The proper quantity of gypsum is usually enough to peep out over the surface of the water over the greater part of the area; that is, about equal volumes of each ingredient. The addition of glue-water to the mixture retards setting. ROBERT GRIMSHAW.

Hanover, Germany.

Plaster of Paris for Pattern Making

For experimental purposes and where but a few castings of medium and light weight are required, plaster of paris has many good advantages as a material for pattern making. It is light, it can be given a smooth surface, it is easily given any required shape and it can be added to indefinitely. While it is brittle, this is more than offset by the saving in first cost and the quickness with which the pattern may be prepared. Plaster of paris sets in from three to six minutes, but if for any reason it is desired to keep the mass plastic for a longer period, one drop of glue to a five-gallon mixture will keep it soft for a couple of hours. Plaster of paris mixed with cold water has an expansion of about 1-16 inch to the foot when hardening. Should this be undesirable, mix with warm water or lime water and there is no expansion.

DONALD A. HAMPSON.

Middletown, N. Y.

To Delay the Setting of Plaster of Paris

Citric acid will delay the setting of plaster of paris for several hours. One ounce of acid, at a cost of about five cents, will be sufficient to delay the setting of one hundred pounds of plaster of paris for two or three hours. Dissolve the acid in the water before mixing the plaster.

Indianapolis, Ind. OTTO L. LEWIS.

POLISHING AND FINISHING WOOD

Mixture for Ebonizing Wood Handles, Etc.

To prepare a mixture for ebonizing wood handles, etc., use logwood, 2 pounds; tannic acid, 1 pound, and sulphate of iron, 1 pound. Apply hot and polish when the pieces have become dry and cold.

Birmingham, Eng. W. R. BOWERS.

Polishing Wood

A very nice polish on wood is obtained by using the following mixture: ½ pint of alcohol, ¼ ounce of shellac, and ¼ ounce of rosin. Dissolve the shellac and rosin in the alcohol; then add ½ pint of linseed oil, and shake the whole mixture. Apply with a sponge, brush or flannel. Rub the wood thoroughly after the application.

E. W. NORTON.

To Finish Wooden Handles, Gun Stocks, Etc.

The wooden parts of tools, the forearms and stocks of guns, etc., are often made to have a fine appearance by French polishing, but this finish adds little or nothing to their durability. A much better finish is to soak the wood in linseed oil for a week and then rub it with an oil-soaked cloth a few minutes every day for a week or two longer. This solidifies and preserves the work. A. L. MONRAD.

TO RECUT OLD FILES

To Recut Old Files

Dissolve four ounces of saleratus in one quart of water and boil the files in it for half an hour, wash and dry them. Have ready in a glass or stoneware vessel 1 quart of rain water to which 4 ounces of best sulphuric acid have been slowly added, keeping these proportions for any amount used. Immerse the files in this preparation, then wash them clean. Dry quickly and cover with a little sweet oil. Coarse files should remain in the diluted sulphuric acid for about twelve hours, though from six to eight hours are enough for fine ones. Files may be recut three times by this process, and the liquors may be used at different times if desired. R. B. CASEY.

Schenectady, N. Y.

To Recut Old Files

Brush the old files with a wire brush, put them in a tub, cover them with water and add 6 ounces of caustic soda per each 100 files. In about two hours brush them again. They will then be free of grease and metal. Then put them in a box, lined with sheet lead, on a wire stand made for the purpose, and in such a way that they will not touch one another. Cover them with a solution made of nitric acid and water, one pint of acid to each gallon of water. In 25 minutes remove them, wash them in water, brush them with a hair brush and put them back in the liquid to which one more pint of nitric acid to each gallon of water has been added. In about 50 minutes remove them again, brush them after washing them with water and put them back in the liquid to which has been added ½ pint of sulphuric acid per each gallon of water. In 15 minutes remove them; wash them first in water, then in concentrated lime water till all trace of the acid has disappeared. When dry they will have the appearance and cutting quality of new files. I used this method for recutting old files long ago and found it O. K., and so can recommend it.

Los Angeles, Cal. J. M. MENEGUS.

EYE WASHES, SALVES, CLEANING COMPOUNDS, DISINFECTANTS, ETC.

Use of Turpentine for Wounds

The machinist often cuts or bruises his hands and by having a small bottle of turpentine handy he can at once bathe the injured part, which will relieve the soreness and perhaps protect it from blood poisoning.

Angelica, N. Y. F. H. JACKSON.

Mixtures for Cleaning Grimy Hands

A good mixture for cleaning grimy hands is made by pounding a cake of "Sapolio" or "Bon Ami" up quite fine, and stirring it into a cupful of pure leaf lard, heated very hot. Stir until well mixed and when it is partly cool pour into a tin or tins of convenient size to get the fingers into.

Worcester, Mass. M. E. HOWE.

To Prevent Hands Chapping in Winter

A machinist's hands are apt to get sore and stiff from exposure. Take a four-ounce bottle and put in same 3 ounces glycerine, 1 ounce alcohol, and from 20 to 30 drops of carbolic acid. After washing the hands, and while they are a little damp, apply a few drops and thoroughly rub it in. It is also good to use at night.

Angelica, N. Y F. H. JACKSON

Artificial Skin for Burns, Etc.

Dissolve equal parts of gun cotton and Venice turpentine in 20 parts sulphuric ether, dissolving the cotton first and then the turpentine. Keep in a tighly corked bottle. The use of the turpentine is to prevent pressure or pinching of the flesh caused by the evaporation of the ether when applied. Water does not affect this covering, hence its value for burns on the face or hands. E. W. NORTON.

For Chapped Hands—Eye Wash

I worked in a drug store for several years and tried many combinations for chapped hands and finally selected the following: Bay rum, 3 ounces; glycerine, 1 ounce; carbolic acid, ½ dram (30 drops). Wash the hands well and apply while hands are soft, preferably just before going to bed. *Rub in thoroughly.* This rarely fails to cure the worst "chaps" in two nights.

Also a most excellent eye wash is as follows: Boric acid, 40 grains; camphor water and distilled water, each 2 ounces. Bathe the eyes freely several times a day. This is handy to have when the eyes are inflamed from having steel or emery, etc., in them. GEORGE C. NASH.

Rockford, Ill.

To Treat Inflamed Eyes—Care of the Eyes

The treatment of an inflamed eye is a matter of some moment in a machine shop, and too much care cannot be taken to treat such cases scientifically. You have only two eyes—unless you are a foreman, and then you are supposed to be a full-fledged pineapple, as far as eyes are concerned. A splendid remedy for an inflamed eye is a weak solution of powdered borax water—either warm or cold—applied by rubbing it in the eye with a cloth, or dropping it in. It is very soothing and will drive the soreness and inflammation out and leave the eye in a better condition than it was before it was irritated. The proper proportion is a spoonful of powdered borax in a glass of water. A mechanic should always bear in mind that the loss of an eye may drive him to selling shoe-strings. A pair of plain eyeglasses will protect the eyes from chips or emery, and borax water is good for tired eyes too—the kind of eyes you have when working too much overtime.

Another eye kink is to get a round looking glass about 3 inches in diameter, and on the back of it near the center attach a cloth band or strap. I made one with a ball-and-socket joint. Now this strap is made to fit easily around the head, the glass resting against the forehead. The function of this glass is to reflect the light from a distant window on to the work. It is a very satisfactory rig to wear when filing to a line or working to a line on a machine. The finer the glass the better is the focus of light reflected. By using a ball-and-socket joint the glass can be instantly adjusted to throw the light on the point you wish to see. Every diemaker ought to have one. CARROLL ASHLEY.

Rochester, N. Y.

Preventing Serious Results from Injuries from Rusted Objects

Everyone knows how a small wound caused by rusty pieces of metal oftentimes develops blood poison, or lockjaw. The following old-fashioned but infallible "first aid to the injured" may therefore be of value to remember. An ordinary lump of brown sugar is heated on the surface sufficiently hot to produce smoke, and the wound is held in this smoke for several minutes. No serious results will follow after this treatment, and all soreness will be taken out of the wound even though the application takes place some time after the accident. The smoke given off by burning woolen rags is equally effective, and, as they are more often available, particularly to a man "off on a job," to keep this simple remedy in mind may be well worth while. DONALD A. HAMPSON.

Middletown, N. Y.

Disinfectant

It is frequently necessary to disinfect our offices and shops; a very effective and inexpensive means is as follows: To 6½ ounces of crystals of potassium permanganate, add one pint of formaldehyde (40 per cent) for every 1,000 cubic feet of room space. The disinfectant should be mixed in a metal receptacle having at least ten times the volume of the ingredients used. This is required to prevent the mixture from boiling over. The receptacle holding the crystals should be placed near the center of the room which is to be disinfected, after ascertaining that all doors, windows, etc., are securely calked to prevent the gas from escaping. The formaldehyde solution should be ready to be poured upon the crystals, which must be done quickly. The room must then be left closed for at least thirty-six hours to obtain the best results.

Denver, Col. E. W. BOWEN.

Compound for Cleaning the Hands

To loosen the oil and grease, the hands should first be scrubbed with a stiff brush dipped in kerosene, and then they should be wiped dry with waste. Take a five-cent box of soap powder (I prefer Soapine, because it lathers freely), add to it an equal quantity of white sand. Mix thoroughly and rub over the wet hands in the form of a paste. This compound will rinse off in any kind of hard or soft, hot or cold water. Hands washed in this manner twice a day will be free from grime and clean all over.

New York. H. J. BACHMANN.

Plaster or Salve for Use in Place of Stitches

To make a plaster or salve which can be used in case of accident in place of stitches where a person has sustained a deep cut, melt together white rosin, 7 ounces, beeswax, ½ ounce; mutton tallow, ½ ounce. Pour into cold water and work with the hands until it is thoroughly incorporated, and roll out into suitable sticks for use. When required warm and spread upon a firm piece of cloth, cutting the wax into narrow strips in case of deep wounds. It will be found to hold the edges of the flesh firmly together. E. W. NORTON.

Useful Salve

While a great many shops now have facilities for attending to shop accidents, the necessity is often felt by the mechanic working in a small shop, or outside, for a useful salve to be applied to wounds in case of accident. The writer has made the following salve himself, has used it, and knows that it is far in advance of most articles for sale in drug stores at ten times the price. The ingredients are as follows: Two parts of swallow oil, five parts of petrol wax, two parts eucalyptus, and two parts of beeswax. ARDEN.

Liquid Court Plaster

At your druggist's procure an ounce bottle and have him fill it three-fourths full of flexible collodion, and fill up with ether. Apply to cuts, bruises, etc., and it protects them and will not wash off. If the ether evaporates, leaving it too thick for use, have more ether put in to liquefy it. It is a good thing to have in the house; also the tool chest. F. H. JACKSON.

Angelica, N. Y.

MISCELLANEOUS USEFUL RECEIPTS

Marking Polished Steel

A very handy way of marking polished steel for sizes, instructions, etc., is to keep a small oil can filled with turpentine with which to saturate a small piece of waste as needed; rub over the surface to be marked and then do the marking with an indelible copying pencil, which will show up very plain. Of course the can of turpentine also comes in handy to use for drilling hard steel, springs, etc.

St. Paul, Minn. ARTHUR MUNCH.

Iron or Steel?

To find out whether a piece is steel or iron touch it with nitric acid, using a stick of wood, and then wash it with water. If iron, a light or azure stain will appear. If steel, the stain will be black.

Los Angeles, Cal. J. M. MENEGUS.

Acid Test for Iron and Steel

A simple acid test for iron and steel is made as follows: The sample to be tested should be filed smooth or polished. Then place it in dilute nitric or sulphuric acid for from 15 to 20 hours; then wash and dry the sample. The best steel then has a frosty appearance, ordinary steel has a honeycombed appearance; and iron presents a fibrous structure in the direction in which it has been worked. A. A.

To Prevent Babbitt Metal or Lead from Exploding

Before pouring the babbitt metal, throw in a piece of rosin the size of a walnut and allow it to melt. If the bearings to be lined with babbitt are warmed before pouring, the metal will run better, thus insuring a better job. R. B. CASEY.

Schenectady, N. Y

Mixtures for Making Plug Cocks and Glass Stoppers Tight

To make an anti-leak and lubricating mixture for plug cocks use 2 parts of tried suet and 1 part of beeswax melted together; stir thoroughly, strain and cool.

A mixture for making glass stoppers tight is made by melting together equal parts of glycerine and paraffin. L. S. BURBANK.

Worcester, Mass.

To Keep Steel Tools in Their Handles

To keep steel tools in their handles, fill the handle with powdered rosin and a little rotten stone. Heat the tang of the tool hot, and then push it down hard into the handle; when it is cold it will be firmly set. M. E. HOWE.

Worcester, Mass.

Strop Paste for Razors and Keen Edge Tools

An excellent strop paste for edging razors or other keen-edge tools is a mixture of levigated oxide of tin, 1 ounce, powdered oxalic acid, ¼ ounce; powdered gum, 20 grains. Mix to a paste with water, spread evenly over, and work well into the strop with some smooth surface. The rough side of the strop gives best results.

Denver, Col. E. W. BOWEN.

To Dissolve Glass

A hole may be cut or etched through glass readily by using hydrofluoric acid. The acid should be applied in the same way as etching acid, using wax to surround the portion of the glass which is to be penetrated. Hydrofluoric acid is sold in wax bottles, as it cannot be kept in glass. It may be handled with a hard rubber dropper similar in construction to the ordinary glass medicine droppers. S. W. GREEN.

Acid Pickling for Forgings

To remove scale from drop forgings which have to be machined, dip in a pickle composed of hot water 24 parts, sulphuric acid 1 part. HARDENER.

To Write Black on Glass or Bright Metal

To write black on glass or bright metal, use 1 to 2 parts of silicate of soda with 10 parts of india ink. Write with a steel pen. F. H. JACKSON.
Angelica, N. Y.

To Cut Off Glass Tubes

Saturate a cotton string in kerosene, wrap it around the glass tube where you wish to have it cut, set fire to the string, and when all parts are ablaze, plunge the glass in a pail of water. Give the top of the glass a light blow with a stick, and there will be an even break all around.
Detroit, Mich. CHARLES SHERMAN.

To Remove Steel Chips from Jigs and the Like

It is often very desirable to remove chips of steel from jigs and the like each time a new piece is inserted. An easy way to do this is to put a pound of caustic soda in a gallon of water and dip the jig in every time it is desired to remove the chips.
Winnetka, Ill. F. PAVLIK, JR.

To Remove Hard Grease, Paint, Etc., from Machinery

To remove grease, paint, etc., from machinery add half a pound of caustic soda to two gallons of water and boil the parts to be cleaned in the fluid. It is possible to use it several times before its strength is exhausted. F. PAVLIK, JR.
Winnetka, Ill.

The Use of Brass Wire in Brazing

In place of spelter use wire or rod brass and boracic acid as a flux. Anneal the end of wire or rod by heating, while the joint is getting hot, and after dipping the rod into boracic acid, apply to the joint, the rod melting at the end will flow into the joint. After the joint is cooled, submerge in hot soda water; this will take off every particle of acid, leaving only the brass to be filed off. F. H. JACKSON.
Angelica, N. Y.

To Weld Spring Steel

An experienced blacksmith has used for years the following in welding steel springs. Just before the steel comes to a welding heat he placed a small piece of Russian sheet iron—such as stove bodies are made of—on the joint; this melts and runs into the joint so that the weld is perfect. X. Y. Z.

Steel Welding Compound

A good compound for welding cast steel is made as follows: 41½ parts, boracic acid; 35 parts, common salt; 20 parts, ferrocyanide of potassium; 7½ parts, rosin; 4 parts, carbonate of sodium. Heat the pieces to be welded to a light red heat and apply above compound, then heat to a strong yellow heat and the welding may be accomplished in the usual manner.

The usual precaution applies, of course, in the use of the above, the same as with any of the cyanides, and that is to avoid breathing the poisonous fumes. A. A.

Bicycle Tire Anti-leak

Many machinists ride their bicycles to and from work and are consequently interested in anything that will make tires more nearly puncture-proof. I have not tried the following anti-leak compound, but infer from a note in the *English Mechanic* that it works successfully on both single and inner-tube tires. Mix ¼ pint of silicate of soda (water glass), ¼ pint of commercial glycerine and a large tablespoonful of rubberine; inject about a teacupful into the tire. If too thick, a little water can be mixed with it to thin it. If rubberine is not available use powdered rosin.
M. E. CANEK.

Process for Pulverizing Borax

To a two-gallon pail of boiling water add as much borax as will dissolve—and a surprising amount will dissolve—12 to 15 pounds in two gallons of water. When as much borax is added to the boiling water as will dissolve, set the pail in cold water, running water preferred. Stir contents vigorously, which will in a few minutes form into a thick mass; spread this out thin on some smooth surface, as tin, where it will soon dry to flakes which, when handled, will crumble to dust. This process is employed here at the Rock Island arsenal. ALBERT D. KNAUEL.
Moline, Ill.

To Restore Burnt Steel

To restore burnt cast steel heat the piece to a red heat and sprinkle over it a mixture of 8 parts, red chromate of potassium; 4 parts, saltpeter; ⅛ part, aloes; ⅛ part, gum arabic, and ¼ part, rosin. A. A.

Anti-freezing Solution

A solution for water jackets on gas engines that will not freeze at any temperature above 20 degrees below zero may be made by combining 100 parts of water by weight with 75 parts of carbonate potash and 50 parts of glycerine. This solution is non-corrosive and will remain perfectly liquid at all temperatures above its congealing point.

Re-inking Time-clock Ribbons

For re-inking time-clock ribbons we use the following receipt for black: 1 ounce aniline black; 15 ounces pure grain alcohol; 15 ounces concentrated glycerine. Dissolve the aniline black in the alcohol and then add the glycerine. For blue use prussian blue, and for red use red lead instead of the aniline black. This ink is also good for rubber stamp pads.

Moline, Ill. ALBERT D. KNAUEL.

To Cut Cork

In cutting cork, the knife should be kept greased. Where, however, the desired piece is symmetrical about one axis, and of circular cross-section, it may best be roughed with a greasy knife and then ground to profile with a coarse emery wheel. Cork pen-holders are made in this way. Where many pieces are to be cut out of sheet cork, it is advisable to use a band knife, against which there is kept pressed a block of grease. ROBERT GRIMSHAW.

Hanover, Germany.

Insulating Covering for Steam Pipes and Boilers

To one barrel of lime use six barrels of sawdust. Slake the lime in an ordinary mortar bed, and when slaked mix in the sawdust, using enough mortar to make it of the consistency of mortar. Apply when the steam is on. The covering is adapted for steam pipes and boilers, more especially in sawmills and other places where a box can be built around the pipe so as to hold the mixture in place. It is approved by insurance companies. THEODORE DISCH.

Milwaukee, Wis.

To Punch Hard Rubber

To punch hard rubber successfully heat the punch and die, or the material. The blanks usually curl or wrinkle into almost every conceivable shape in the operation of cutting. To straighten and bring them back to their original outline, allow the punchings to drop into a pan of hot water. The action of the hot water causes the curled parts to return to their former flat shape, the same as before passing through the die. L. C. CARR.

Lynn, Mass.

To Test Galvanized Wire

The Western Union Telegraph Co. subjects its wires to the following test in order to ascertain that they are well galvanized. The wire is plunged into a saturated solution of sulphate of copper (blue vitriol), and permitted to remain in this for one minute, after which it is wiped clean. This process is repeated four times. If the wire appears black after the fourth immersion, it shows that the zinc has not all been removed, and that the galvanizing has been well done; but if it has a copper color, the iron is exposed, showing that the zinc coating is too thin. O. G.

To Test White Lead

This simple test to determine the purity of white lead may be found useful where much painting is being done. It is as follows: Select a piece of charcoal of firm structure, and hollow out a cavity in one side about ½ inch in diameter and of the same depth. Put a sample of white lead in the hollow about the size of a pea, and subject it for a few moments to a blow-pipe flame. If the sample is pure, it will quickly reduce to metallic lead. Adulterated white lead will generally contain a residue that cannot be reduced. M. E. CANEK.

Packing for Gas Engine Cylinders and Pipe Carrying Gasoline Vapor

To prepare packing for joints in pipes, etc., carrying gasoline vapor, mix a quantity of graphite and kerosene to a thick paste and apply the paste to both sides of sheet asbestos. When dry the packing may be cut to the shape desired. The graphite helps the asbestos make intimate contact with the iron and thus maintain a tight joint continuously at high temperature for an indefinite time. H. J. BACHMANN.

New York.

Packing for Gasoline Pumps

For packing pumps on gasoline engines use asbestos wick-packing rubbed full of regular laundry soap; it will work without undue friction and will pack tightly. Common rubber-packing is not as good, as the gasoline cuts it out. A. A.

To Remove Grease or Dirt from Mercury

To cleanse mercury first put a ten per cent solution of nitric acid in an iron ladle, and then the mercury to be cleaned; place same over a blacksmith's forge until the nitric acid boils. The dirt will then rise to the top, and leave the mercury perfectly clean in the bottom. Care must be used not to let the mercury boil, as the fumes are very poisonous. H. C.

Investigating Adulterations in Belts and Leather

Some manufacturers make their belts and leather heavier in the following way: The leather is kept in a current of steam at low temperature until its pores are well open. Then it is put in a solution of glucose. The leather absorbs the liquid, and in drying the water evaporates and the pores close, retaining the glucose. To find out whether belts or leather have undergone this operation, put a piece of the suspected leather in some distilled water, and when it is well soaked, half fill a glass tube with some of the water, add a few drops of sulphate of copper, and fill the tube with a solution of caustic potash. Stir the liquid well and let it boil on an alcohol lamp. If the leather is natural, no change will take place in the liquid, but if it contains glucose, a characteristic precipitate of copper will form, due to the action of the glucose on the solution of sulphate of copper and potash. J. M. MENEGUS.

Los Angeles, Cal.

To Babbitt Crossheads

Some classes of engines have a single bar guide, with a crosshead of the enclosed type, three sides of which are babbitt lined. The crosshead is put in place on piston rod and guide and the babbitt poured in. I find it an advantage to coat the guide heavily with white lead before pouring the babbitt. This allows the crosshead to be removed with little trouble and requires but little scraping to get a good running fit. J. V. N. CHENEY.

South Portland, Me.

Washing Oily Waste

The following is an excellent method of washing oily waste. The chief objection to most of the common methods employed is that the waste, after being dried, is found to be matted and of a hard, gritty texture. The common method of washing the waste, using sal-soda in solution, is a good one, as far as the cleaning qualities are concerned, but it leaves the waste hard and matted, so that it is difficult to handle. A simple remedy for this is to rinse the waste (after being cleaned in the sal-soda solution), in very hot water, to which has been added a quantity of liquid ammonia. This will render the waste soft and light when dry. T. E. O'DONNELL.

Urbana, Ill.

Molding Mixture for Rubber Stamps and Patterns

The following mixture is one which can be used for making molds for rubber stamps, special shapes of rubber, or for complicated, odd, or queer-shaped patterns of small size, as the working must be done inside of ten minutes; the surface takes a finish as smooth as glass if well rubbed. If an impression is to be made, the surface of the type or article to be impressed should be rubbed with a solution of kerosene, and graphite. Plaster of paris, 5 pounds; French chalk, 2 pounds; china clay, 2 pounds; dextrine, ½ pound. Mix with dextrine water, which is made by dissolving 1 pound of dextrine in one gallon of water. FRANK G. STERLING.

Lowell, Mass.

To Mend Broken Oilstones

A valuable oilstone can usually be saved when broken, even if there should be several pieces. The pieces must first be thoroughly cleaned and all oil driven from the fractured surfaces by heating on a hot iron plate. After the surfaces to be joined are properly prepared, they are well dusted with powdered shellac and again heated until the shellac is melted and flows well into the joints. The heating should be done on a smooth metal plate and the stone kept from the flame; otherwise it is likely to crack in other places. Neither must it be overheated, for the same reason. When the shellac has melted, the parts are pressed together and clamped until they have cooled. A joint so made often lasts as long as the stone, and if carefully made leaves no mar in the cutting surface.

Chicago, Ill. O. M. BECKER.

To Scale Cast Iron

To remove the scale from cast iron use a solution of 1 part vitriol and 2 parts water; after mixing, apply to the scale with a cloth rolled in the form of a brush, using enough to wet the surface well. After 8 or 10 hours wash off with water, when the hard scaly surface will be completely removed.

Schenectady, N. Y. R. B. CASEY.

To Braze Steel and Iron Without Heat

To braze steel or iron without heat take ¼ ounce fluoric acid, 2 ounces of brass filings, and 1 ounce of steel filings. Put them all into the fluoric. Touch each part of the work with the mixture, and put them together. Take care that the fluoric acid is put into an earthen vessel.

Rochester, N. Y. JOSEPH M. STABEL.

To Clean Jewelry, Silverware and Metals

The following receipt is one that not all jewelers know. It is also a good preparation to clean the hands with; it will not crack the hands if vaseline is rubbed in well immediately after rinsing them off in water.

Make a saturated solution of cyanide of potassium by taking a quantity of water, and dissolving the cyanide in it, until no more cyanide will dissolve. Dip the article in this solution until the dirt is eaten off (this takes but a short time), then rinse off in hot water, and dry in boxwood sawdust. The article will then look better than when new. PARKE B. SHEE.

St. Paul, Minn.

Receipt for Making Wax Tapers for Cores

Take equal parts of beeswax and powdered rosin. Melt the wax, sprinkle in the powdered rosin, and stir until well mixed. If beeswax cannot be had, use paraffine. This composition does not soften the core as does the ordinary paraffine tapers, because the rosin goes into the core when it is baked and hardens it. If paraffine is used it is better to make the tapers by dipping cotton wicking into the melted composition, as the paraffine makes it rather brittle. When beeswax is used, the wicking is not necessary, and the tapers can be formed in the same manner as that employed by pattern-makers in forming beeswax fillets. JOHN B. SPERRY.

Aurora, Ill.

Die Sinkers' Impression Wax

In the following I give two receipts for die-sinkers' impression wax. In the first the exact proportions of some of the ingredients are not given, but the maker can use his own judgment, gradually adding more of one than the other until the right consistency is obtained. 1. Beeswax, 6 parts; white wax, 1 part; a small quantity of cornstarch; sufficient Racine castor oil to make it of the desired consistency. Add stearine if too soft. 2. Another receipt is two parts of beeswax, and one part bayberry wax. I have found powdered chalk useful to remove the stickiness of this wax.

Niagara Falls, N. Y. C. W. SHELLY.

Making Wax Impressions

It often happens that it is required in the manufacture of goods to make a wax impression of a sample or model. To do this successfully proceed as follows: Oil the surface of which the impression is to be made very slightly with a few drops of oil applied to a little waste. Then take common beeswax, melt it slowly, but do not boil it. Mix it with one or two tablespoonfuls of lampblack to half a tumbler of beeswax and stir the mixture. In order to make the wax impression show up clearly, take a fine hair brush and brush a little powdered graphite or rouge over the object on which the impression is to be made.

Wallingford, Conn. C. W. SHELLY.

For Washing Shop Windows

Soap and water are poor materials with which to wash greasy and dirty shop windows. The labor cost is excessive; the soapy water gets into the joints of the window sashes and hastens decay; and there is liable to be a good deal of soapy water slopped over benches, tools and machines. The quick way, the economical way, and the good way, is to use the following preparation, which has been used by the writer with good success and satisfaction for the past ten years. Dilute alcohol with three times its bulk of water. Stir into this whiting enough to thicken it somewhat. Apply this to the glass with a cotton cloth or waste. Leave it fifteen or twenty minutes to dry. Then rub off with a cotton cloth or a handful of waste. If sashes are to be painted, there will be no need of a long wait for the wood to dry, as the alcohol will very much hasten the evaporation of the water and leave the woodwork in fine condition for the painter.

Peabody, Mass. OSCAR E. PERRIGO.

Satin Finish on Aluminum

The article should first be dipped in a caustic soda or caustic potash solution—potash preferred—then thoroughly washed in clear water and dipped in a bath of concentrated nitric acid, after which it should be thoroughly washed and dried in hot sawdust. The caustic solution should be prepared in a tank provided with a steam coil and should test with Baumes' hydrometer at anywhere between 20 and 30. The length of time an article should remain in the caustic solution is a matter of judgment. The solution should attack the aluminum rapidly, and upon removing the article from the solution, the solution should boil furiously on the metal. After washing, the articles should show a very black color, which turns to a silvery white finish upon dipping in the nitric acid. The best temperature for the caustic solution is at 200 degrees F., just below the boiling point. By the use of a steam coil the solution can be kept at an even temperature, and the strength of the solution can be maintained by adding small quantities of caustic from time to time. The temperature and strength of the solution are very important.

The principal point to bear in mind in washing and drying is to dry without streaks, which is accomplished if the sawdust contains no pitch or rosin.

This finish can be improved by scratch-brushing the article before dipping or by first dipping in the two solutions and then scratch-brushing and afterward dipping again. The scratch-brushing destroys the grain of the metal and reduces the possibility of the article drying with streaks.

Bridgeport, Conn. S. H. SWEET.

To Prepare Fine Abrasive Quickly

To quickly prepare fine abrasive use FFF emery or "15-minute" carborundum with benzine or naphtha for a liquid, mixing them in a square bottle. Use about two ounces of the abrasive to one quart of liquid; shake well and then lay the bottle flat on its side for the number of minutes needed to settle; then pull the cork and let the liquid flow out until level with the cork hole bottom. The liquid just drawn off can be used at once with a brush, but by allowing it to stand for a time, the top portion can be poured off, leaving the abrasive with a little benzine which will evaporate quickly, and leave the clear powder.

In explanation of the term "15-minute" carborundum, would say that this is a term applied to fine abrasive obtained by the process just explained (manufacturers, of course, using water-tanks instead of bottles), the time the liquid is allowed to stand, in minutes, being used to distinguish it. Thus, if it stands 15 minutes it will be known as 15-minute abrasive, etc.

SCOTTY.

Cleaning Fluid for Fine Fabrics

This cleaning fluid may not be of much use in the shop, but if some machinist should get the machine shop grime on his "Sunday-go-to-meeting" trousers, he will find it useful for cleaning out the spots; it works like magic: Sulphuric ether, three drams; alcohol, six drams; chloroform, three drams; gasoline, one quart. The mixture can be used safely for cleaning the most delicate fabrics, but being highly inflammable, it must be used with caution around fires and open lights. M. E. CANEK.

To Prepare Tripoli or Emery Cake

Tripoli, emery cake and crocus are all made in practically the same manner, the change being made in the composition when it is desired to have the composition more greasy. Melt tallow and paraffine wax or beeswax together. Beeswax is by far the best, but the cost of the same has led to the use of paraffine, which in many cases will work equally as well. After the tallow and wax are thoroughly melted, add tripoli or emery, whichever is to be made, a little at a time and stir in well until it is as thick as is possible to make it; then pour out into a large tin, or better still, into the molds made for the purpose, and allow to cool. J. L. LUCAS.

Bridgeport, Conn.

To Mix Lampblack and Shellac

Mixing lampblack and shellac is not so simple a matter as it appears, as many an amateur and novice has found out. The tendency is to form lumps, when the two are mixed by throwing or even sifting the former into the latter. The lumps of course can be reduced and an intimate mixture obtained by considerable patience with a paddle or pestle. The whole difficulty is easily avoided if the lampblack is first wet with alcohol and throughly worked down into a soft paste with a paddle or spatula. The black paste is then added to the shellac and mixed uniformly by stirring. The result is a smooth flowing and working shellac. Other pigments can be treated in the same way. O. M. B.

Cast Iron Brazing

The ingredients for this cast iron brazing may be had at any first-class drug store and should cost no more than about 50 cents. They consist of 1 pound of boric acid, 4 ounces pulverized chlorate potash, and 3 ounces carbonate of iron. These ingredients should be thoroughly mixed, and kept perfectly dry (a glass jar or bottle answering the purpose), and when wanted for use, a small amount should be taken and mixed with grain spelter. In trying this brazing for the first time, take a piece of cast iron of say one square inch cross-section, hold the broken parts together by clamps, and fit the break closely in order to form a strong joint. Use a gas forge if possible, but an ordinary blacksmith's forge will do if no gas forge is available. When a blacksmith's forge is used, use charcoal, and be sure to get a high heat. When the pieces of the casting are in place, heat the joint to a good bright red before applying the flux. Then apply it liberally with an iron rod, flattened on the end, and work along the fracture, gradually raising the heat to almost a white heat. Then shut off the heat and allow the casting to cool slowly. If this work is done carefully, the joint will be as strong or stronger than the original casting.

Another formula is: 1 pound of boric acid, 3 ounces of caustic soda, and 3 ounces of carbonate of iron. This is mixed with spelter in the same way as in the first formula, and must also be kept dry. The main points to keep in mind when brazing cast iron are to have the metal clean and free from grease; not to apply the flux until a bright red is reached and then to be sure to raise the heat high enough to make the mixture flow nicely. ETHAN VIALL.

Decatur, Ill.

ANTIDOTES FOR POISONS

Antidote for Nitrate of Silver

In case of poisoning by nitrate of silver take large doses of salt dissolved in water, after which take one teaspoonful of mustard flour in warm water.

Antidotes for Compounds of Arsenic

In cases of poisoning by compounds of arsenic take a teaspoonful of mustard flour in warm water, then plenty of oil or milk or linseed tea.

Antidote for Ether

When vapors of ether are inhaled, the effect is similar to that of chloroform. Cases of this kind should be treated by cold effusions and artificial respiration.

Antidotes for Ammonia Acid, etc.

In a case of poisoning by ammonia, soda potash, alkaline, silicate and sulphates, take strong vinegar with water, large doses of oil or large doses of milk. Vapor of ammonia may cause inflammation of the lungs.

Antidote for Oxalic Acid

In case of poisoning by oxalic acid, and its salts, take very thick paste of lime and water by large spoonfuls at a time. After several doses take large drafts of lime water, and finally about four ounces of castor oil.

Antidote for Prussic Acid and its Salts

In case of poisoning by prussic acid and its salts, cyanide, sulpho-cyanides and nitro-benzine, apply continuous and heavy douches of ice cold water on head and spinal column, mustard plasters on the stomach and soles of the feet, and prevent sleep.

Lead Poisoning

Lead poisoning is indicated by constriction in the throat and stomach, crampy pains, and blue lines around the gums. As an antidote take sulphate of soda or magnesia or a teaspoonful of mustard flour in warm water, and strong solutions of Epsom salts in cold water.

Antidotes for Acids

In a case of poisoning by carbonic, sulphuric, nitric, muriatic, nitro-muriatic or phosphoric acids, take the white of an egg well beaten up with water or a teaspoonful of mustard flour in a cup of hot water. In the case of sulphuric, nitric, muriatic or nitro-muriatic acids, a dose of very thick lime water acts as an antidote.

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